INDUSTRIAL ARTS and VOCATIONAL EDUCATION

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CONTENTS

The Challenge of Industrial Arts, *by F. Theodore Struck*..... 295
Organizing Evening Classes, *by Reginald A. Ivy*..... 297
A Traffic Safety Program, *by R. F. Jennings*..... 299
The Vocabulary Load of the Individual Instruction Sheet, *by Max S. Henig* 300
Printing Education in America — III, *by Chester A. Lyle*..... 301
Trade-Vocabulary Word Study: The Engine Lathe, *by Victor J. Smith* 304
Idle Industrial-Arts Classrooms, *by William W. Wills*..... 306
Editorials 308
Progress Cards Instead of Report Cards, *by J. Allen Morris*..... 310
A Fable for the Ex-Tadpole Class, *by Edwin M. Wyatt*..... 312
A Printshop Clean-up System, *by Harold R. Johnson*..... 312
A Directory, *by Fred C. Finsterbach*..... 313
Testing in Terms of Our Objectives, *by Allen A. Cooper*..... 313

Supplement

Chords for Spacing Off Circumferences.....No. 332

Problems and Projects

Ye Old Town Pump Desk Lamp, *by Elwood B. Hovey*..... 315
Construction of Venetian Blinds in School Shop, *by John G. Rohner* 315
The Colonial Lamp, *by Gerald A. Boate*..... 316
Emery Wheel Safety, *by R. W. Burgett*..... 318
Computative Method for Centering Views, *by Emil E. Shattow*..... 318
A Printing Woodworking Project, *by R. Randolph Karch*..... 319
Shoe Rack, *by Fred W. Megow*..... 320
Sheet-Metal Urns, *by H. E. Anderson and W. A. DeVette*..... 320
Cut-Off Tool, *by J. K. Olsen*..... 322
Brackets and Signs for Home and Business, *by Harold O. Akeson*.... 322
Clamp for Gluing Rack, *by Louis F. Barocci*..... 324
A Hanging Bookshelf, *by R. M. Hammes*..... 325
Glazing Frame, *by B. E. Banks*..... 326
Indian Snowshoes of Wood, *by W. Ben Hunt*..... 327
Centerpiece, *by W. Ben Hunt*..... 328

Posters

Adaptability, *by Louis M. Roehl*..... 325
Impatience, *by Louis M. Roehl*..... 326

Association News..... 328
Personal News..... 11A
New Publications..... 11A
School-Shop Equipment News 15A
News Notes..... 15A

AN ANNUAL ANNOUNCEMENT

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION will welcome news notes about happenings in the field. The extraordinary things that happen in the individual school shop are usually of great interest to the average reader, and the publishers of this magazine are glad to pass these items along.

It remains for the teacher, then, to note the exceptional items encountered in his workaday contacts in his shop and to send them to the editor. In this way, a historical contribution is made and a professional record of the matter has been given at the same time.

This applies also to items of personal news, where old positions are changed for new, or where promotions have been made.

Send in your news notes then — we shall be glad to broadcast them.

THE AVA CONVENTION

This year the old historical city of San Antonio in the Lone Star State will be host to the members of the American Vocational Association who will flock in great numbers to the convention that is to be held December 2 to 5.

Local and national committees are hard at work to make this convention a real success. Better plan to attend.

Articles Indexed—The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," and "Education Index."
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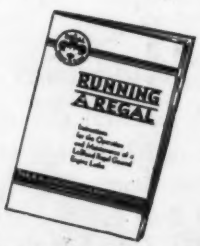
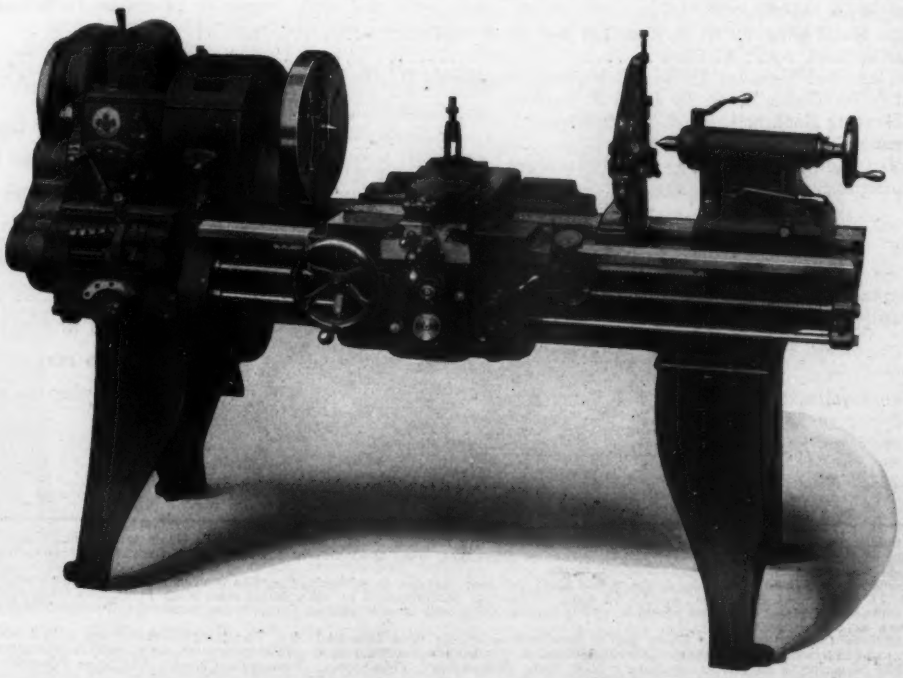


This 70-page book is an "Encyclopedia of Lathe Operation." Sells for 25 cents, but sent free to any instructor when requested on the school letterhead.



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October, 1936
Vol. 25, No. 10

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

The Challenge of Industrial Arts

F. Theodore Struck

Department of Industrial Education, Pennsylvania State College, State College, Pennsylvania

An excellent statement of the place industrial arts should occupy in the field of education, in the life of the nation, and in the mind of the industrial-arts teacher.

Industrial-arts education in America is standing at the threshold of new frontiers. Just as life, in this fast-moving age, is an adventure and an exploration, so also is industrial-arts education; just as present-day social, economic, and political life is fascinating and challenging, so likewise is the work of teaching industrial arts.

In all parts of America, from Florida to Maine and from the Atlantic to the Pacific coast, in rural as well as in urban districts, there are numerous groups of teachers of industrial arts who have caught the vision of a democratically conceived industrial-arts instruction which draws its inspiration from contemporary life. They know from first-hand experience that there is nothing artificial, cold, sterile, or lifeless about industrial-arts education; they see the far-reaching social-economic implications of the seething life about them, and the correlative opportunities that are theirs to guide individuals through the unusually appropriate means that the practical arts afford. They see their work in its true, broad, embracive perspective.

That industrial arts is appealing to youth as well as to adults is a commonplace; that teaching industrial arts is an unusual opportunity for attaining personal happiness, and also for rendering socially valuable service is perhaps not so commonly accepted, but it is true and real to thousands of progressive teachers.

Freedom

There is a freedom in teaching industrial arts that is hard to attain in the classroom. The pupils, under proper guidance, readily learn to be resourceful. They do not need to be urged onward in their work, but consider it a privilege to be allowed to work overtime. The atmosphere of the industrial-arts shop is one of eagerness to accomplish. The work is such that it presents an ideal setting for *real* learning.

If purposing, planning, executing, and evaluating are educational, then industrial arts is educational, for that is the stuff of which the daily work is composed. If socially centered instruction draws its ideals, its materials, its methods, and its techniques from contemporary life, then industrial arts offers rare opportunity to teach in the interests of a better social order. If true culture springs from the life and work of a people — even as it did in the "Golden Age" of Pericles, and in the time of Queen Elizabeth, then it cannot be something that is handed down to posterity, but something that emerges through creative, socially inspired activity such as is the heart of modern industrial-arts education.

Creative Work

For those who seek self-realization and happiness through creative thinking and doing, industrial-arts teaching offers a tempting field. On the one hand, there is the challenge of guiding the attitudes, the thinking and the manipulative skills of growing youth. The industrial-arts teacher has the opportunity of using the experience of age to guide the enthusiasm of youth. His is the privilege of teaching how the fine and the industrial arts can be blended in the creation of things of beauty as well as of utility. His, likewise, is the chance to use the strong behavior tendencies of human nature as a means toward growth. It is his privilege to combine feeling and thinking with doing as is true of life. He can use the manipulative aspects of instruction as a means of educational and cultural enrichment by using the handwork as a vehicle for mental effort and for guiding appreciations. In addition to this, the teacher himself can labor in that much-to-be-sought spirit — the spirit of the artist-craftsman. During school hours, he stimulates and guides the efforts of his pupils, much as the great artists of all time have helped those who strove toward eminence in their respective fields. And when those hours are over, the industrial-arts teacher, still aflame with creative zeal, not infrequently lends assistance or guidance to some home-crafter, or turns to his own workbench, because such activity is both work and recreation to him. If play is defined as activity that is engaged in voluntarily, then the term "work" has almost lost its usual connotation when applied to the industrial-arts teacher for he loves his work; seeks it; it is close to his heart.

Teaching industrial arts is emotionally satisfying, physically energizing, educationally stimulating, and culturally rewarding. It calls for hard work, for self-control, for courage and for devotion, as do all socially valuable professional pursuits. Honest work, conscientiously carried out, is one of the keys to happiness.

Socially Significant

Industrial arts, going beyond the narrowly set standards of an outgrown yesterday, can be made to function in reducing wasteful buying, extravagance in artificial amusements, loose living, delinquency, crime, and corruption in political life. Socially conceived and democratically administered, industrial-arts instruction is constructive rather than destructive. It makes for social in-

sights and sympathy between peoples by developing true appreciations of all honest labor; and makes for happy family life by cultivating attitudes, knowledges, and abilities that function in everyday living. It makes for uprightness and morality by developing habits of constructive work that are the very foundation upon which social welfare rests.

Teaching industrial arts, rightly conceived, involves vastly more than teaching something about materials and processes, and developing hand skills. The tools and materials are but means toward broader educational ends. Industrial-arts instruction develops socially significant habits. Pupils learn to cooperate with one another and with their teacher. The instruction often calls for group planning and group action as well as for individual initiative — situations that are very typical of adult life. The work is such as to call forth and develop the kinds of emotional, mental, and physical qualities that are essential to a better social order. Industrial arts teaches individuals that, in the last analysis, the best interests of individuals and of the larger social group are one and the same. What is best for the group as a whole is best for the individual; what is not best for the larger group is likely not the best for one. Industrial arts effectively teaches that individuals find their greatest usefulness and their greatest happiness in rendering service to others. The narrowly selfish and self-centered person does not experience the warmth and satisfaction that comes through living in conformity with socially oriented goals. Thus, industrial arts makes possible guidance that goes far beyond the narrow, technical aspects of shop instruction. The industrial-arts teacher is teaching individuals in the broadest sense of the word; guiding their ideals, their attitudes, their thinking, and their acquisition of essential skills.

Toward an Evolving Culture

In this rapidly changing world, there is need, on the one hand, of passing on to posterity those values which the race has found worth while. There are many things that have served their usefulness, but there are others that will continue to make life sweeter and better through all time. Among such values are the contributions of art, and of the master craftsmen in all aspects of human endeavor. Industrial arts teaches us to appreciate and to value the great art and craftsmanship of all peoples. Life is not only made richer thereby, but it forms a *basis for a better culture.*

Industrial-arts teachers, taking their cue from the community life with which their work articulates so closely, believe in constant adaptation to ever changing social and economic conditions, but they also recognize clearly that an evolving culture calls for *more* than that. They know that life can be made better through redefining objectives; through co-operative planning, and through group action. It is the high privilege of industrial-arts teachers to guide the citizens of tomorrow toward deeper, richer, and happier living through active participation toward an evolving culture.

Unconquered Frontiers

Industrial arts is not limited to what can be done within the four walls of the school building. In line with the changing need for wholesome leisure and recreation, industrial arts is today expanding its scope of service in various ways and with an ever widening group to serve. This can be shown by calling attention to a few of the newer services that are now developing. One of these is club activities, such as those of craftsmen's clubs now being sponsored on a state-wide and on a national basis. Many clubs are of a purely local character and many of them are conducted by industrial-arts teachers during after-school hours. That these clubs will grow rapidly in numbers and in favor is quite clear. Some are organized as home-craft clubs; others are called hobby clubs; still others are sponsored by other social agencies such as scout organizations, Y.M.C.A., Y.W.C.A., community recreational centers, and religious organizations. Progressive schools offer a wide range of extracurricular club activities which are very popular.

More than this, industrial arts is reaching out into the undeveloped area of adult recreational and avocational activities. It has found its way into the CCC camps, and into rehabilitation and retraining work. It is on the threshold of a wider and much needed service to unemployed adults; it is a boon to those who seek relaxation from high-pressure, repetitive, monotonous work: and it is a lifesaver for the many adults who for one reason or another are unemployable.

Some progress has already been made, here and there, toward making industrial-arts instruction available to girls and women. Surely there will be a wider place for them in the industrial-arts programs of tomorrow, even as there will be more opportunity for boys and men to take certain aspects of training in homemaking.

Not a Steppingstone

Teaching is America's greatest profession, viewed from the standpoint of numbers employed, and it is one of the greatest in terms of service to humanity. More men are needed in public education, not because they are better than women, but because they are different. Growing boys and girls need the influence of men as well as of women, just as the home needs both. Some schools would do well to offer industrial arts in order to take boys out of what would otherwise be an almost totally feminine school atmosphere.

Industrial-arts education has progressed to the point where it is no longer regarded as a "special subject." Nor should it be looked upon by virile men as a foothold to a future job in industry, or to vocational teaching. Industrial arts should no more be looked upon as a steppingstone to trade and industrial education than the latter is viewed as a rung in the ladder of industrial arts. Teachers will continue to shift from one field to the other — provided they have the necessary qualifications — as opportunity offers. But it cannot be too strongly emphasized that each area of teaching — industrial arts on the one hand, and vocational-industrial education on the other — is equally important and equally worthy of the best that the best can give.

Industrial arts, viewed in its newer socially significant relationships, is as fascinating as is the roaring Niagara; it is as inspiring as the new-born springtime verdure, and it has an appeal to young and old alike as eloquent as a puppy's wagging tail.

Industrial arts is a life career extraordinary. It is big enough in its possibilities to challenge anyone's wholehearted efforts. It is the stone which the builders rejected, but which has become the head of the corner.

TRADE INFORMATION

A clearing house of information about occupations has been established by the National Occupational Conference, 551 Fifth Avenue, New York City. This is a nonprofit research organization, established and supported by the Carnegie Corporation of New York City. Publications on occupations and vocational guidance are obtainable at cost.

Organizing Evening Classes

Reginald A. Ivy

Brookline Evening School,
Pittsburgh, Pennsylvania

A few timely suggestions for the shop teacher who contemplates teaching evening-school classes.

Preliminary Work Before Registration

Cards should be sent to all old students acquainting them with date of registration, date and time of opening night, inviting their attendance and urging them to spread the news among their friends who may be interested in woodworking. Addresses of these old students can be secured from school records.

Mimeographed circulars given day-school pupils to take home to their parents are helpful in getting together a full-sized class.

Co-operating with other night-school groups, a short radio talk on the various school activities may be arranged.

A sign, or cartoon featuring the woodworking class, can be made suitable for display in local store windows. Many novel and attractive ideas for such can be found in the different craft magazines.

Have mimeographed copies of "Shop Procedure and Requirements" prepared in readiness to pass out on registration night. The students will then have some idea of what is expected of them before starting work.

A "Student Data" form, shown below, will prove helpful to the instructor in planning the work for the first night. It should be filled in when the student registers and will furnish the instructor with useful information as to the ability and experience of each individual enrolling in the class.

STUDENT DATA FORM

Name	Address	Occupation	Employed	Woodworking Experience	Proposed Project
J. Smith	10 Home St.	Machinist	No	Handy work around home	End table
G. Brown	121 John St.	Clerk	Yes	4 yrs. high school	Desk
M. Stein	35 Page St.	Housewife	Yes	1 yr. evening school	Screen
H. Jones	2 Rose St.	Photographer	Yes	None	Undecided

Before the opening night a visit should be paid to the instructor of the day school with the object of making arrangements with him for the storing of lumber, supplies, and unfinished work. For this purpose, space should be allotted, if possible, for the exclusive use of the night class.

During this visit it will be well to check over and operate every machine in the shop, especially if the equipment is old, as, even machines have "individual differences." By so doing, you will become acquainted with them before opening night.

An inventory should be carefully made of all tools for which you are to be responsible.

It is an advantage to the instructor to have some acquaintance with the district from which the students are likely to be drawn, the social status, etc. This will have a bearing on the nature and class of project that can be successfully made in the shop, and will determine the policy of the instructor in many other ways. At the same time it will be borne in mind that individuals of high or low intelligence can be drawn from the same district. Broadly speaking, however, a quiet residential suburb will produce a class of students that require a policy differing in many ways from that which the instructor will adopt toward a class drawn from an industrial district.

Organization

In the community-center type of evening school, as distinct from the regular technical school, where prescribed courses are offered, the student is usually given the option of choosing his own project. Should the project selected be, in the opinion of the instructor, too advanced or beyond the ability of the student, a little tact and diplomacy will be used in suggesting a project less ambitious. In forming judgment of the student's ability, the information furnished in the "Student Data" form will prove of use, so too will the clarity and practicability of any drawings the student may furnish of the project chosen. For each project, *insist* that there be a practical drawing whether it be made by the student or obtained elsewhere.

Many of the students will rely on the instructor to furnish them with ideas and drawings for their projects and for this reason it will be necessary to have on hand a collection of sketches covering a variety of practical projects. These should be classified and indexed for ready reference. Building material and millwork catalogs frequently contain drawings and sizes of doors, trellises, arbors, cabinets, etc., and are useful. Many good ideas are to be found in the various craft magazines, while most public libraries have many books on woodworking and kindred arts that will furnish much worth-while material. A short list of such books might be furnished each student at the time of registering. Short, snappy information sheets and job sheets will save time, but not all students will read them. A small-size set of Stanley educational charts are effective.

Some of the students enrolled in the class will probably have already

attended similar classes and will be familiar with general procedure. Frequently among them will be found some who will be glad to assist the instructor and relieve him of some of the minor work of supervision, such as keeping an eye on beginners, once the instructor has started them out, watching out for lumber waste, helping cut up stock, etc. The instructor should be quick to sense whether or not such help is given wholeheartedly and to assure the student that it is perfectly O. K. if he prefers not to do so. A student can be given charge of the tool cabinet and will check tools at the opening and at the close of each period, another student can help get out lumber for beginners, another can take charge of small supplies. If too many duties are not imposed on one man this idea will work surprisingly well and as a result the instructor will have more time to devote to his real work of instruction.

If small repairs or minor adjustments to any machine become necessary, make every effort to fix it immediately.

The Exhibit

This will be arranged on a school night and in co-operation with the exhibits of other departments. Invite all those concerned — together with their friends. Remember, the exhibit is the best means of selling the evening class to the community, so advertise it to the utmost. Talk up the exhibit frequently to the students during the semester as it will work up enthusiasm and help in producing a good showing. Get a good photograph of the exhibit. It will make the very best "ad" on the next registration night.

SHOP PROCEDURE AND REQUIREMENTS
MILLTOWN EVENING SCHOOL

Monday and Wednesday Evenings — 7:30 to 9:30

First Term — September 17 to December 5 — 12 weeks.

Second Term — January 2 to March 27 — 12 weeks.

Shop Procedure and Requirements

Members of the class are expected to secure plans, or make working sketches giving all dimensions of their job, and to check with the instructor before starting, to enable him to help them analyze their jobs for:

1. Correct construction and design
2. Kind of lumber to use and economy in cutting
3. Machine work
4. Practicability of the job chosen

When information sheets or job sheets are given you by the instructor, *read them carefully*. They are well worth the few minutes' time spent in reading them. They contain necessary information for your use.

Working plans and drawings of various projects are furnished by the instructor if desired. Other sources are the craftsman magazines, such as Popular Homecraft, The Home Craftsman, Industrial Arts and Vocational Education, Industrial Education, and Popular Mechanics and Popular Science. These magazines can usually be found in the public library, together with many books on these subjects.

Lumber[1] is supplied at cost. Long or wide boards should not be cut if smaller pieces are available. A knot in the board is not always objectionable. If in doubt consult instructor. Return unused material to lumber pile. Keep pile straight and tidy. Students are not allowed to operate any machine until instructed in its use and safe operation.

Never stand in line with the revolving parts of any machine.

Examine all stock for nails, screws, loose knots, etc., before cutting.

Avoid heavy cuts. Keep your machine and parts well oiled.

Keep floor near machine clear of scrap stock. Avoid loose clothing.

Never use a machine after power is cut or before it attains full speed.

At each machine are posted rules for its safe operation — READ THEM.

Any violation of these rules may result in request for withdrawal from the class.

We are having an exhibit of our work at the end of the term. Your co-operation and suggestions for a *bigger and better exhibit* will be welcomed.

Clean-up is announced 10 minutes before quitting time. Your co-operation is asked in helping leave the benches and shop in neat and orderly condition.

Safety posters to be placed near or on machines:

CIRCULAR SAW

Use the safety guard whenever possible. (This is a state law.) When ripping stock less than 2 in. wide, use the push stick. Also use it to remove small pieces lying close to saw. When ripping stock, cut up to half the length of your board, then pull it back carefully and cut from other end to complete the cut. Do not use ripsaw fence for cross cutting and do not use it as a stop for cutting off several pieces of the same length. Pieces less than 8 in. must not be cut on the circular saw. Adjust the height of saw blade so that it just cuts through your stock. Clamp the fences securely.

[1]Where lumber is supplied free, students are expected to select projects requiring a minimum amount of lumber. Students can, of course, bring their own lumber on larger jobs.

BAND SAW

Adjust saw guide so that it clears your stock by about ½ in. before starting saw. Do not cut until the saw is running full speed. Small pieces are not to be cut on this saw. Do not cut too fast or force the saw on curves — back out slowly. Never cut "round" stock on band saw. Do not let anyone stand on your right — if the saw breaks, it will fly in that direction. In case a saw does break, switch off and get away until it has stopped. If you hear a clicking noise, stop the machine immediately and report to instructor.

LATHES

See instructor to get a lathe assigned to you before starting lathe work. Clamp tailstock securely. Keep toolrest close to stock. Hold tools firmly. Be sure your lathe is well lubricated.

GRINDER

Use the glass shield or goggles to protect your eyes. Use the oil wheels for grinding wood-cutting tools. *Keep toolrest close to stone.*

PLANER

Measure your stock before setting the thickness gauge on the planer. Always have the feed roll contact the stock. Minimum length of stock to be cut on this machine in 15 in., thickness ¼ in. No edge planing, except on heavy stock.

JOINTER

Check depth of cut before using. Do not cut end grain. Minimum length to be cut on this machine is 12 in.; width, 1 in.; thickness, ¼ in. Do not tamper with the front table.

Supplies

The following list for a class of 25, is intended to serve as a guide only and should be changed or modified to suit the prevailing conditions:

Lumber

100 ft.	½"	Poplar S2S
100 ft.	¾"	Poplar S2S
25 ft.	1½"	Poplar S2S
25 ft.	2"	Poplar Rough
100 ft.	¼"	Bass S2S
100 ft.	⅜"	Bass S2S
100 ft.	½"	Bass S2S
100 ft.	¾"	Bass S2S
50 ft.	½"	Chestnut S2S
100 ft.	¾"	Chestnut S2S
25 ft.	2"	Chestnut Rough
100 ft.	¾"	White pine S2S
100 ft.	1½"	White pine S2S
75 ft.	¾"	Oak S2S

1 Bundle ½" hardwood dowels
1 Bundle ⅜" hardwood dowels
1 Bundle ¼" hardwood dowels

Screws

2 gross ½" No. 6 f.h.b. iron screws
6 gross ¾" No. 8 f.h.b. iron screws
6 gross 1" No. 8 f.h.b. iron screws
6 gross 1¼" No. 10 f.h.b. iron screws
4 gross 1½" No. 10 f.h.b. iron screws
1 gross 2" No. 12 f.h.b. iron screws
2 gross ¾" No. 6 r.h. blued screws
2 gross 1" No. 8 r.h. blued screws
4 gross 1½" No. 8 r.h. blued screws
2 gross 1¾" No. 10 r.h. blued screws

Nails

1 lb. ½" No. 17 wire brads
2 lb. ¾" No. 17 wire brads
2 lb. 1" No. 17 wire brads
3 lb. 1¼" No. 16 wire brads
3 lb. 1½" No. 16 wire brads
2 lb. 1¾" No. 15 wire brads
1 lb. 2" No. 14 wire brads

Sandpaper

½ ream No. 1/0
¼ ream No. 1
¼ ream No. 1½

Miscellaneous

6 pint cans liquid glue or
5 lb. animal glue
1 gal. lubricating oil
5 lb. flake shellac
1 gal. denatured alcohol
1 gal. turpentine
1 qt. walnut oil stain
1 qt. mahogany oil stain
1 qt. dark oak oil stain
½ doz. 1" flat brushes
4 doz. 6" coping-saw blades (pin type)
1 Bundle rags or waste
10 half-round rough files
Spare fuses or fuse strips

A Traffic Safety Program

R. F. Jennings

Chairman, Faculty Safety Committee,
South High School,
Minneapolis, Minnesota

A plan for "selling" safety which deserves serious study.

For a year and a half our school has been conducting a general safety campaign with the basic idea of "Selling Safety." Inasmuch as the curriculum provides no place for a comprehensive organized course of instruction, the methods have had to be largely extra-curricular.

Selling, Not Preaching

"Selling Safety," needs some explanation. Advice so often resembles the water that rolls off the proverbial duck's back, particularly with pupils of senior-high-school age, that the faculty safety committee felt that a safety-education program consisting merely of advice and the presentation of cold statistics would not produce the desired results. Accordingly, in all five divisions of the program, namely, "Fire Prevention," "Hygiene and First Aid," "Industrial Safety," "General Accident Prevention," and "Traffic Safety," the plan has been to *sell* the ideas to the students rather than to *tell* them what to do and what not to do.

Objectives

Inasmuch as this article deals only with the traffic-safety phase of the program, I shall give what we regarded as the desired end in that field. Putting it in the form of a question, "What could we do to induce John Doe, a 17-year-old high-school boy, to drive a car safely and act safely as a pedestrian at times when he is far removed from the influences of the school?" The end result sought was to *motivate* students to active thinking, resulting in personally made decisions which in turn would bring about constant alertness when exposed to traffic dangers, or when in danger of inflicting injuries upon others.

Five Sales Steps

The plan of *selling traffic safety*, which was put into action in September, 1934, was built around four steps. The first step was; stimulate interest by means of a publicity "stunt." Second, sell the idea that the school as a whole *can* "put across" this life-saving program and that every pupil is a vital force and an important person in the campaign, in other words, *make participation attractive*. Third, keep "working on the students" at definite intervals with popular, interesting and convincing instruction, part of which is in the form of participation in projects, in other words, *repetition*. And fourth,. put the twelfth-grade pupils through a short course in which they will learn the traffic laws and *make certain decisions* in their own minds.

A Four-Year Program

Before describing some of the specific ways in which the four sales steps have been put into action, it should be pointed out that the campaign operates in cycles. One is a four-year cycle leading up to the twelfth-grade short course (our school is a four-year high school). The second cycle operates as a part of the first and is one school year in length. Every year there is a new traffic safety drive with a fresh publicity "stunt" followed by numerous activities. One day each year is set aside as Traffic Safety Day.

Stimulating Interest

Last year's publicity "stunt" was an overturned car near the sidewalk in the school yard with a dummy resembling an injured person lying on the ground near by. This was prepared as a project by one of the school clubs. A large sign with the traffic drive slogan, "Eliminate Death on the Highways," was placed near by. Students and passers-by crowded around the "accident" and motorists parked their cars. Reporters from the city papers took pictures of the overturned car and gave the drive additional publicity.

This year's "stunt" was a traffic booth, erected in the center of the school lunchroom frequented by about 2,000 pupils daily. The booth was managed by members of the student council. A new traffic light about eight feet high was borrowed from the city engineering department and placed beside the booth. The booth itself was about six feet square and had a counter on one side. It had a roof and was decorated with crêpe paper (treated so as to be fireproof) making it resemble a small house. Large signs labeled it "Traffic Safety Booth." Electric lights were placed on the booth and connected with a rotary sign flasher which, of course, attracted attention. A show card announced that on a certain date, reaction-time tests would be taken at the booth. The traffic light was placarded with, "New Type Traffic Signal to be Used in Minneapolis."

All of this was not put into operation for three days, except for the flashing lights. By that time considerable curiosity had been aroused. Then students in the school shops installed a reaction-time apparatus, made by them and

connected it with the traffic light. Students in the drafting classes made several hundred small blueprints of a numerical table showing distances cars would travel at different speeds and different driver reaction-times, before the brakes started to work. About fifty students participated in preparing and managing the booth. About one hundred reaction-time tests were made each day during the lunch periods and copies of the blueprints mentioned given out. This lasted for one week. Hundreds of copies of traffic safety literature were handed out by girls at the counter. Traffic-law booklets were given to students showing driver's license cards. At the same time the entire building was placarded with posters announcing the date of the annual traffic safety day. These posters were made by students who used as the main illustration a cover picture on traffic safety from the Minneapolis Journal Safety Magazine. A quantity of these was obtained from the newspaper office. These attractive pictures in colors were mounted on large orange-colored backgrounds and appropriately lettered. Other devices used included:

1. Signs, made by wood-shop students, resembling "No Parking" signs bearing such slogans as "Be Careful of the Children," "Give Your Car an Even Brake," etc.

2. Slides, flashed between reels during school movies not related to safety, giving five-second reminders on traffic safety.

3. A front-page article with a cut in the school paper.

Popularizing Participation

Without going into detail, the following types of 45-minute programs were used periodically upon the student body of 2,700 in auditorium assemblies with the idea of appealing to the student's intelligence and creating a desire to help in the campaign to reduce traffic accidents rather than (as before mentioned) to preach or give advice and dry statistics:

1. Sound motion pictures on traffic safety.

2. Speakers from police department, city legal officials, chairmen of traffic-safety organizations, automobile clubs, etc.

3. Student speakers using colored slides obtained from insurance companies to illustrate their talks.

4. One-act plays produced by drama classes.

Repetition

In addition to the programs mentioned which have been given in some form four times a year, sometimes combining two or more types in one meeting, the following constitute a more frequent means of selling traffic safety and have been used in our plan:

1. Constantly changed lithographed posters placed at twenty strategic points in the halls. These are in use every day and are rotated.

2. Frequent student-written articles in the school paper.

3. Cuts in the school paper obtained by purchasing the "mats" from the National Safety Council.

4. Occasional short sound motion pictures run in with the daily shows given during the last half of each lunch period.

5. Reference material, assembled by the school librarian, used by English and public-speaking classes.

6. Safety instruction given in scheduled classes in "community-life problems."

The Senior Short Course

This is the culmination of all preceding traffic-safety instruction and centers around membership in a traffic-safety club. Only members of the "A" senior class are permitted to try for membership in the club and all members of this class are required to. Meetings are held with this group of students in which the steps above mentioned are gone through again; that is, there is prearranged publicity to stimulate interest. There is a plan to "glorify" the project and make membership in the club a coveted honor. And there is repetition. To become eligible a pupil must first pass a 126-question objective test on the Minnesota traffic laws. In addition he must write an essay on the subject, "How can Minneapolis drivers be induced to participate in a safe-driving campaign?"

Five cash prizes for the best essays are presented at the time of graduation as part of the commencement program. Pupils becoming eligible for membership in the traffic-safety club may make a voluntary written pledge of safe driving if they so wish. So far all members have made a pledge. Membership cards in this club are issued, signed by the student president and the principal of the school.

Our system of "selling traffic safety" is in full force at the present time. It is not described here as a perfect plan or even a good one, but simply as *a plan* that is being used in an effort to cope with the increasing dangers of the highways.

The Vocabulary Load of the Individual Instruction Sheet

Max S. Henig

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An excellent article on how to write instruction sheets which are intelligible to the student.

A criticism frequently leveled at the individual instruction sheet is that many students are quite incapable of grasping the material the sheets present. A little study would undoubtedly lead the critic to realize that it is either only the relatively few unwilling or inadequately prepared students who cannot profitably use these sheets, or that the sheets have not been satisfactorily adapted to the abilities of the pupils for whom they are intended. The problem of adapting a lesson sheet to the abilities of a heterogeneous group is indeed great. An indication of the seriousness of this problem can be obtained by considering just one element that needs to be provided for in making this adaptation, that of the number of unfamiliar words or the "vocabulary load" of these individual instruction sheets.

"It is a good thing to let your pupils know there are some things they don't know," an experienced teacher remarked in attempting to allay her younger colleague's misgivings over the fact, that

he frequently found himself talking over his pupils' heads. This may be a perfectly sound bit of educational procedure so far as the oral presentation of instructional matter is concerned. Oral instruction permits and relies upon repetition, illustration, and extensive explanation to secure results. This is emphatically not so with the instruction sheet. The diction of these sheets must be such that the average pupil can grasp the facts presented with a minimum of effort. And this despite the fact that each individual instruction sheet is made as concise as the topic permits. To this end, the writer of such sheets must attend always to the aptness of his wording and particularly to its comprehensibility.

After all, these sheets all possess inherent difficulties, due to the very fact that they are instruction sheets, and that they present material, generally of a technical nature, which in itself presents learning difficulties. Obviously, then, the learning problem should not be augmented unnecessarily. Whatever can be done to facilitate the learning process, whether it be simplifying the sentence structure of the sheet or relying almost entirely upon a vocabulary that is familiar to the average student, should be done.

Attaining this standard of a lesson sheet so written that its diction is scientifically adapted to the students for whom it is intended, is well within the experienced teacher's abilities. Thorndike, as a result of his extensive studies on the vocabulary load of books, advocates the inclusion of only one new word to every two hundred of reading matter.[1] The question is whether this standard applies to the particular case of the individual instruction sheet. Where, as was remarked before, the sheet in question presents instructional material that, by its very nature, whether it be due to the novelty of its ideas, their complexity, or their abstractness, will be difficult to assimilate, the ratio of one unfamiliar word to every two hundred of reading matter is undoubtedly sound and proper. Under these circumstances, the student is in practically the same situation, so far as learning difficulties are concerned, as the youngster who is turning the pages of *Pinocchio* or *Ivanhoe;* or of the high-school student who is studying a foreign language, and for whom experts now recommend one unfamiliar word to every one hundred of text. Where the reading matter covered is more familiar to the student, as in the case of a review lesson, the proportion of unfamiliar words may be somewhat higher. The part of wisdom is to err on the safe side.

Inextricably involved in this problem of the optimum ratio of unfamiliar words in an instruction sheet is the matter of technical terminology. It is obviously quite impossible to write on any specialized subject without using its specific terminology. Pedagogically this is an entirely different matter than the one under discussion. Since machine-shop practice, radio maintenance, chemistry, and so on, each has a nomenclature of its own, it is an essential part of instruction in these fields to make apt use of this terminology. The writer of lesson sheets dealing with any technical subject should use expressions like resistors, inductance, orthographic projection, soffit, and so on, whenever the occasion arises. It is simply up to each student to set himself the task of mastering these terms as they appear. It is but good sense under such circumstances, however, not to augment the difficulties already present by including in a sheet already made formidable by a generous supply of uncommon terms, still other unfamiliar words. The sheet that does is but piling Ossa on Pelion.

Individual instruction sheets so written that they present at most one unfamiliar word to every two hundred of reading matter, except in the case of a review lesson or where a technical terminology is required, will undoubtedly go far toward solving the learning difficulties that many students experience when faced with this method of instruction.

[1] Thorndike, E. L., *Teachers' College Record*, Vol. 36, Oct.-Dec., 1934, pp. 123–144.

Printing Education in America—III

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Canton, Ohio

This is the third and final part of a survey of the growth of printing education in America under public, private, commercial, labor, and industrial auspices.

(Continued from the September issue)

The Experimental Press, of Sewanhaka High School, Floral Park, N. Y., although one of the smaller printing schools of the country, bears a reputation of a high degree for its consistently fine printing. The printing course is part of the general curriculum of the school and is included as a medium to promote the so-called cultural value of general education. It is recognized as a major subject by the Board of Regents of New York State and is accorded the same value toward graduation as a course of similar length in academic subjects. A specimen of the high type of work produced in this school is the "Craftsman's Invocation" poster.

Hugh Flaherty, head of the printing department of Sewanhaka High School, is a printer of the fourth generation of English ancestry.

Printing education as emphasized by the board of education of the city of Albany, N. Y., through mutual confidence between labor, employers, and educational committee, has given this city a unique standing. Equipped better than the average with excellent courses in day, evening, and trade-extension work, the system offers advantages of real merit. At this school journeymen are allowed to attend regular day sessions for instruction at any time. E. A. T. Hapgood, director of vocational education, is in charge of the printing courses for the city.

One of the far western colleges offering instruction in printing is the Colorado State Teachers' College, at Greeley. It is state supported, and has had a printing course for over a period of more than twenty years. Courses are offered for two distinct groups of students, one of these being made up of industrial-education majors who are fitting themselves to use printing as a part of an industrial-arts program when they go out to teach.

Inasmuch as the Colorado State Teachers' College is a

teacher-training institution, they have a complete school from pre-school through senior high school, which is used for laboratory teaching and experimentation. Evening- and summer-school classes are held. When it is taken into consideration that there are many so-called six weeks' courses given by normal schools, one appreciates the excellent program offered by this school. It is interesting to note that the head of the printing department, Mr. Ralph T. Bishop, is a member of the Greeley City Council.

Rural journalism, as exemplified in its teaching at the South Dakota State College, Brookings, S. Dak., is a unit of printing education in itself. The college offers a four-year course in printing and rural journalism, conferring a bachelor of science degree upon the completion of the college requirements.

The aim of the course is to prepare young men and women for the field of rural journalism, where they may own and operate their own plants. Because of this aim, the plan of instruction is broad. In technical printing, students learn typography, slug casting, machine operation and maintenance, press and make-ready, newspaper composition and make-up, and fine book printing.

From the business-office standpoint, they study cost finding, estimating, shop management, accounting, advertising. For editorial work the students are trained in reporting, editing, editorial writing, feature writing, and history of the profession. All receive practical experience on the college newspaper. All receive a well-rounded college education.

Mechanical equipment in the laboratories is such as may be found in the average, or better than average, plant. There are six composing machines, one monotype caster, several presses, including two flat-bed cylinders. Other equipment includes saw, type gauge, stitcher, folder, cutter, bundler, caster, smelter, up-to-date type cabinets, stones, etc.

The rapid growth of the department has made necessary the addition of a composing laboratory, 24 by 36 feet, a smelting and casting room, and a dustproof stockroom.

The department began shortly after the world war, as a training school for printers, and was merged with the department of rural journalism in 1925. Its success is evident from the fact that every graduate is employed, many of them owning and operating their own rural newspapers.

The departmental staff consists of seven men, six of whom are college graduates. The seventh completed his collegiate work in 1935. All seven have broad experience in practical printing and journalism. A. A. Applegate, A.M., heads the department.

The story of printing education in America would not be complete without reference to the United States Government Printing Office, located at Washington, D. C., whose system of training apprentices is based on practical shop experience, and is planned to inculcate in the young men selected, a common-sense, understandable, and usable knowledge of fundamental theories and practice of their chosen trade. The course is planned to advance the apprentice in his work in direct proportion to his increase in proficiency, until at the end of his four-year course, he is developed into a full-fledged all-round journeyman.

The applicant for appointment first submits a formal application to the Civil Service Commission. The applicant must be not less than 16 nor more than 19 years of age at the time of taking the examination, and must have had the equivalent of an eighth-grade education; he must be not less than 62 inches in height and weigh not less than 108 pounds at 16 years of age. If he passes his examination with a rating deemed high enough by the Commission, he is recommended to the Government Printing Office for a six months' probationary appointment. The age limit, however, does not apply to war veterans. On reporting for duty he is subjected to a strict physical examination by the office physician. The apprentice and his parents or guardians are also required to sign an indenture for four years' training.

In the Government Printing Office, instruction is made more practical because of the extensive equipment. The old system of a lead man laying out the form and the apprentice dressing it only, thereby performing his work mechanically, has been eliminated. The apprentice is taught not only to impose a form so that it will fold correctly but is given an ocular demonstration of why it is so imposed. For example, when a boy imposes a form for the press, he is taken to the respective machine rooms and given an actual demonstration of the functioning of the different machines for which the work has been planned. By this method the apprentice becomes acquainted with the mechanical reason for any particular imposition. The same procedure is followed in the use of line cuts and halftones. If a book is to be printed on machine-finish, super-calendered, or single-coated paper, the reason why a line cut or an 80, 100, 120, or 150 screen engraving is desirable is explained, a proof being taken on different kinds of paper from the respective screen productions. In every unit of the trade the same care is exercised, to the end that the apprentice may be thoroughly informed as to *cause and effect*. The astonishing lack of knowledge by many journeymen printers as to the *reason why* a particular piece of printing is planned in a certain way has caused especial attention to be given to this phase of the training.

An earnest endeavor also has been made, to produce printers who will have a practical knowledge of the relation of type to paper; of the kind of paper to be used with illustrations; and of the most economical way to impose and make up forms in their relation to the press, folder, and stitching operations that follow in the production of the finished work.

In addition to the technical training, the apprentice is given an academic course which includes spelling, commercial arithmetic, English grammar and composition, United States history, history of printing, and American literature.

History of printing is given by lecture and includes the history of the formation of the alphabet; the early books before typography; Gutenberg, Faust, and Schoeffer; early printers in Italy, Switzerland, France, Spain, Holland, England, and America; short historical sketches of several different subjects such as types, music, copyright, newspapers, publishers, the monotype, linotype, stereotype, electrotype, engraving, press, bindery operations, organization, schools, making of paper, ink, and a brief history of the Government Printing Office.

Appointees must serve for a period of at least four years as apprentice to the assigned trade before they can be appointed to journeyman standards in such trade. Appointees are paid for the first year one third of the minimum rate of wages of mechanics of the trade to which assigned; for the second and third years, one half; and for the fourth year, two thirds of the rate.

Employees are entitled to thirty days' accrued leave of absence each year, together with all legal and executive holidays, with full pay, and are entitled to compensation for injuries received in the line of duty.

On June 27, 1934, President Roosevelt announced the appointment of Augustus Edward Giegengack as the Public Printer of the United States in charge of the Government Printing Office in Washington, D. C. Mr. Giegengack entered

the printing field in 1905 as an apprentice, and his rapid rise in his chosen profession has been of inestimable value not only to himself, but to printing education as a whole. His work as head of the world's largest printing plant, and director of the United States Government Printing Office, assures the apprentices of a guidance program of real merit.

Educational Work of the I. T. U.

The Bureau of Education of the International Typographical Union has played a very important part in printing education in the United States and Canada. No other trade organization has an equal educational program. It is the policy of the International Typographic Union to cooperate with public schools teaching printing in an endeavor to have the instruction meet the highest industrial and educational standards, and in order to regulate the number and character of applicants seeking admission to the trade. This sympathetic co-operation insures competent instruction for printing pupils; increases mutual respect on the part of industry and the schools; and is doing much to provide a high type of apprentice for the industry.

To further promote co-operation, the International Typographical Union lessons in printing, now required of apprentices in the trade, are made available to accredited schools for class instruction. No individual subscriptions to enroll in the I. T. U. lessons by correspondence are accepted from pupils attending such schools. This has the effect of encouraging boys to remain in school to acquire as much trade education as possible, and at the same time, gives the schools a better chance to develop a desirable type of apprentice.

An accredited school, in the sense above used, is one with sufficient equipment to teach the fundamentals of the trade; that employs, as instructor, a practical printer who is acceptable to local organizations of printing employees and employers; and that uses new I. T. U. lessons in printing as a basis for instruction.

Under these conditions, the theme papers are graded by the instructor of the printing class in school. The instructor's report, covering the name of the student, the particular unit, and the average type of grade attained, is then permanently recorded in the Bureau of Education for recognition when the student enters the trade. As further evidence of satisfactory progress, certificates bearing the student's name and grade are mailed to the instructor by the bureau. Grades may be certified to the Bureau at any time convenient to the instructor. Five certificates covering the five units of the course are equivalent to its completion and will be so recognized when the student enters the trade as an apprentice. This is the method of granting educational credit for work done on the lessons in approved schools.

Since the establishment of the educational courses in 1907, 19,297 have enrolled and 9,027 graduated.

Summing up, we find the bureau has written, organized, and made effective practical courses of instruction covering every department of composing-room work. Its texts and courses are recognized as the best available anywhere, and of a character acceptable for high-school, college, and university rating.

It has put the educational work of the Union on a sound business and educational basis. It has issued printing texts noted for such unusual features as modernity, up-to-date illustrations, interesting treatment, graded subject matter, lesson outlines. trade glossaries, intelligence tests, shop exercises. class drills, and trade credit.

Owing to the fact that the code of fair competition for the graphic-arts industries had not made any provision for the further support of educational work, and that the United Typothetae of America, upon its designation as national code authority for the commercial relief printing industry under the code, had been forced to discontinue its department of education, and to confine its activities wholly to code administration, the American Institute of Graphic Arts signified its willingness to carry on the educational work.

The Institute, now in its twenty-first year, is well fitted for the purposes and objectives of the educational program, and at all times was an absolutely noncommercial body, confining its activities wholly to the work of raising standards of craftsmanship and design throughout the graphic arts, and to raising the standards of taste among the general public, as well as to creating a greater and truer appreciation for those factors which make for good graphic-arts products. Thus, the Institute has been, in every sense, an educational society, all its activities and its aims and objectives being wholly educational in nature.

In taking over the work of the program of printing education, it was the purpose of the Institute to put it on a self-supporting basis, the necessary funds for carrying on the work being raised through additional memberships in the Institute, as well as by endowments. Thus, the Institute not only broadened the scope of its own activities in assuming the sponsorship of the printing-education movement, but also extended the scope of that movement by making it a more all-conclusive program of graphic-arts education. With this in view, a division of education was set up by the Institute, under the supervision of a directing committee which is responsible for carrying out the policies adopted for the future educational work.

Printing Education Week, established some six years ago as part of the general educational program of the United Typothetae of America, was continued under the American Institute of Graphic Arts. Devoted to bringing about a closer relationship between those in the industry and schools where instruction in printing is being given, this movement reached a point of universal co-operation.

Unfortunately, at the end of 1935, the American Institute of Graphic Arts found itself obliged to discontinue the sponsorship of the printing-education movement insofar as direct participation was concerned.

The Annual Conference

At the Fourteenth Annual Conference on Printing Education, held in Boston, Mass., in June, 1935, a permanent organization of the printing-education movement was established, under the new name of The Graphic Arts Education Guild. Until the regular election of officers at the next annual conference, as provided for in the constitution, the following have been named as officers by the general committee to take care of the necessary business of the organization:

President, Mr. J. Henry Holloway; industry representative, Mr. Harry L. Gage; secretary-treasurer, Mr. John A. Backus; educational director, Mr. Fred J. Hartman.

The interest and enthusiasm which have been aroused through these twenty-five or more years have brought the movement through various stages to its present degree of success. Under the effective leadership of Mr. Fred J. Hartman. Mr. Harry L. Gage, Mr. John H. Chambers. Mr. E. E. Sheldon, the late Mr. A. A. Stewart, Mr. John W. Finley, Mr. J. Henry Holloway, and Mr. Frank Phillips. and the continued support of many others, printing education in America moves onward.

It has increased the number of lessons in the regular course

from 37 to 49, and the total number of pages from 220 to 1,280, all without raising the price to the subscriber.

It has written and issued six additional courses, consisting of 100 lessons, covering various important departments of the trade.

It has guaranteed to every apprentice and every journeyman member thorough technical training at a minimum cost.

It has increased the total enrollment in ten years from 2,103 active students to 19,297, and from 177 graduates to 9,027.

It has written a history of unionism for the instruction and guidance of apprentices.

It has broadened the industrial outlook for thousands of apprentices, protecting their ranks and the industry from an influx of misfits, and has materially strengthened the favorable opinion of trade unionism as a constructive force in the eyes of the public.

The value of the work of the Bureau of Education cannot be measured by ordinary standards. In its broadest implications, it is one of the most constructive and far-reaching efforts toward industrial progress that has ever engaged the attention of a labor organization, and as such, has won the nation-wide approval of employers, labor leaders, educators, public officials, and others interested in constructive labor policies. The full import of this work will become apparent only with the passing years, when apprentices now being trained will dominate the industry.

Mr. John H. Chambers, a former teacher of printing and advertising, an instructor of teacher-training classes, a department editor, an author, is now director of the Bureau of Education, International Typographical Union, Indianapolis, Ind.

For over twenty years, the American Type Founders Company, through its department of education, has been a very vital factor in the development of printing education in America. The department has a staff of experienced educators, from whom any school may receive counsel in planning and organizing its printing department. By means of this service, which is rendered without charge, school officials may obtain an efficient layout, showing how proposed printing equipment should be arranged to secure the best results in instruction, together with specifications of every item required to equip the plant properly. Mr. John A. Backus, who is the director of this department, followed in the footsteps of Mr. Frank K. Phillips, to whom much credit for the success in printing education in the past is due.

Trade-Vocabulary Word Study: The Engine Lathe

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Trade-vocabulary word studies should represent the assembly in definitely usable form a group of trade words for use in instructing apprentices and industrial students. The unit which follows is made up of words related to a single metal-working machine, the engine lathe.

The list is not intended for use primarily as a speller; possibly too little stress is laid upon spelling from the standpoint of drill; nor does it recognize the well-established fact that, for a given group of young men or adults, the individual vocabulary is small. The position is rather taken that a vital part of a mechanic's equipment* lies in his ability to use and know the language of his trade, a thing sometimes overlooked in the development of skills and also a thing particularly important in schools representing cosmopolitan groups or where the home language is often other than English.

The selection of the words used has been based upon machine-shop experience in both trade and classroom. I am indebted to Mr. William Sachs, machine-shop instructor, El Paso Vocational School, for looking over the list of words and making several helpful suggestions. No attempt has been made to have the list exhaustive. Teachers using the list, therefore, will find it possible to add additional material; arrange the groups in more usable order; rearrange the material; or select only such parts as may be suited to their course, lesson plans, objectives, student group, class maturity, and equipment.

While the following paragraphs were primarily developed for the use of "related" classes in the vocational school, particularly in oral English, attention is called to the importance of using Pearson's suggestion as to good procedure in teaching spelling, "A pupil should see, hear, pronounce, and write." Another important consideration lies in the knowing of the definition of trade words and being able to use them correctly in oral discussions which relate to shop procedure. Limited space and other considerations have prohibited the inclusion of definitions but I have added a number of typical sentences illustrating such word applications. Since it seems advisable to use groups of words in their proper trade relationship, I have expanded the illustrative sentences to paragraphs in several appropriate instances. The loss suffered by the omission of definitions can be largely corrected by proper oral discussions on the part of the instructor. The use of tools, charts, and models will assist in such discussions. It is my personal opinion that the related teacher should not be free from responsibility with respect to instruction closely associated with the trade itself.

A knowledge of trade vocabulary is a necessity to the worker. This study should therefore prove helpful.

The lessons which follow indicate an attempt to arrange homogeneous groupings with regard to meaning rather than difficulty in spelling. Again, the groups are arranged roughly in the order of shop approach. In several instances such groups are split and the more advanced terms postponed for a later lesson. For example, in the case of the names of lathe tools, one group appears early in the list but some of the less-used terms are postponed for later treatment as Lesson II on the same topic.

Lesson 1. Lathe Parts (I)

back gears	bull-gear clamp
belt shifter	carriage

*See also Shuman, John T., "Technical Vocabularies," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION MAGAZINE, October, 1933.

change-gear handle
cone pulley
countershaft
cross power
cross-power feed
cross feed
cross-feed screw
cross slide
dead center
half nut
half-nut handle
hand feed
hand wheel
head stock
knob
lead screw
live center
locking bolt
loose pulley
reverse lever
shifting (shipper) rod
spindle
split nut
stud
tail-spindle lock
tail-stock spindle
tail-stock lever
tail-stock clamp
tight pulley
tool post

Sentence example: John threw in the *back gears* and then accidentally moved over the *shipper rod* before he had changed the *bull-gear clamp*. What happened?

Lesson 2. Setting Up Work

arbor
bell-cup punch
button (toolmakers)
C clamp
center punch
center punch, automatic
center reamer
chalk
center clearance
countersink bit
clamp, lathe dog
combination drill and countersink
dog
drill bit
drilling
draw over
expanding mandrel
fluited center reamer
mandrel
mount work
stock
reference marks
reverse work
set at zero
work centers

Example paragraph using words from Lesson 2: In centering work preparatory to turning on the lathe the operator secures the proper size *stock*, faces each end with *chalk*, and locates each center by an approved method. He then centers each end with the *center punch*, and tests for accuracy. If necessary, he will *draw over*, the punch marks. With a *drill bit* and *countersink* or with a *combination drill and countersink* he will then drill the centers to proper depth so that there will be ample *center clearance*.

Lesson 3. Processes and Cutting

allowance
backing out
backing off
boring
chamfering
cut air
countersinking
cutting off
facing
initial cut
knurling — fine, coarse, or medium
lard oil
clearance angle
compare
cutting edge
double cut
draw under (ride)
dull
knurling
single cut
plain turning
polishing
roughing down
reaming
single cut
taper turning
turning shoulders
forming

Lesson 4. Cutting Tools (I)

boring bar
back rake
carbon steel
carbon cutter
chip curve
bit
clearance
depth of cut
diamond point
high-speed cutter
high-speed steel
knurling tool
left-hand tool
right-hand tool
round-nose tool
side tool
side rake
tool holder
turning tool, round nose
forged tool

Lesson 5. Measuring and Testing Tools

barrel
calipers
caliper feel
center gauge
center head
check
diameter
firm joint caliper, (outside and inside)
gauge
hermaphrodite caliper
keyhole caliper
master taper
micrometer
oversize
plug and ring gauge
rough turn
scale, measuring
slide caliper
snap gauge
spring calipers (inside and outside)
surface gauge
taper gauge
test
transfer caliper
vernier

Lesson 6. Speeds

cutting speed
peripheral speed
rate of feed
r.p.m.
spindle speed
speed indicator

The lathe operator must have some knowledge of the *r.p.m.* of his lathe in order to regulate the *spindle speed*. It is necessary to obtain a satisfactory *cutting speed* as the *peripheral speed* of stock increases greatly with its diameter.

Lesson 7. Condition of the Metal

anneal
case harden
high spots
scale (on stock)
hard
brittle
tough
cold rolled
cold drawn
heat treated
carburized

Lesson 8. Auxiliary Equipment

center rest
chuck
draw chuck
drill chuck
drill holder
faceplate
follower rest
independent jaw chuck
magnetic chuck
nipple chuck
self-centering chuck
steady rest
taper attachment
turret head
T wrench
V block

Lesson 9. Finishes

finish all over
finishing cut
filing
mill file
paint
polish
tool marks
emery cloth
knurl
lap

Where necessary, *tool marks* may be removed with a *mill file* and the turned article *polished* with *emery cloth*.

Lesson 10. Miscellaneous Items

alignment
ball peen
belt dressing
carriage feed
chattering
chucking
collet
eccentric
longitudinal
Morse taper
disconnect
engage gears
off center
graphite
machined
pinion
power feed
reverse
headless setscrew
set over
sleeve-drill bushing
swing
taper
taper per foot
throw out
toolroom
tool check
work axis

Lesson 11. Kinds of Machines

geared head lathe
cone-pulley lathe
speed lathe
turret lathe
quick-change lathe
change-gear lathe
engine lathe
power lathe

Lesson 12. Lathe Parts (II)

apron
bearings
bed
cam
change gears
compound rest
clutch
compound gears
cross belt
feed reverse
feed rod (large lathes)
four-step cone
feed mechanism
feed gears
feed box (on quick-change lathes)
gap bed
gear stud
gears
individual drive
index plate
legs
line shaft
quick change
rack
saddle
V's
ways

Lesson 13. Cutting Tools (II)

brass tool
cutting-off tool, straight
cutting-off tool, bent
double cut
fluted chucking reamer
end mill
gang tool
necking tool (finishing also)
rose reamer
square-nose tool
threading tool
turning tool
corner tool
threading tool, inside

Lesson 14. Threading

coarse threads
left-hand thread
double thread
draw out
draw back
lead
right-hand threads
mesh
triple threads
pitch
screw-pitch gauge
outside
inside
thread gauge
thread stop
thread chasing dial
threads per inch

The *thread stop* on the lathe should be set before the process of threading starts.

Stop the lathe and *draw out* the tool at the end of each cut.

After the initial cut the student should test the number of *threads per inch* with a *screw-pitch gauge*. This gauge is known also as a *thread gauge*.

Lesson 15. Machine Fits

allowance
force fit
running fit
shrink fit
sliding fit
push fit

Lesson 16. Safety

attention to work
"feel" of the machine
foolproof
headless setscrews
proper clothing
safety first
oiling and adjusting
ride
heating up

TRADE VOCABULARY

Machine Shop — The Lathe

accuracy
alignment
anneal
apron

arbor
automatic
back gears
back out
back rake
backing-off
ball peen
barrel
bearings
bed
bell-cup punch
bell shape
belt dressing
belt driven
belt shifter
bevel
boring
boring bar
bull-gear clamp
button (toolmaker)
caliper feel
calipers
cam
carbon cutter
carbon steel
carriage
carriage feed
case harden
C clamp
center clearance
center gauge
center head
center line
center punch
center reamer
center rest
chalk
chamfering
change-gear handle
change gears
chaser
chattering
chip curve
chuck
clamp lathe dog
clearance
clearance angle
clutch
combination drill and countersink bit
compare
compound gears
compound rest
cone pulley
cone-pulley lathe
control knob
countershaft
countersink bit
countersinking
crank
cross belt
cross feed
cross-feed screw
cross-power feed
cross slide
cutting compound
cutting edge
cutting off
cutting-off tool
dead center
degree
depth of cut
diameter
diamond point
disconnect
dog
double cut
draw chuck
draw over
draw under-ride
drill bit
drill chuck
drilling
dull
eccentric
eccentric chuck
end mill
engage gears
engine lathe
expanding mandrel
facing
faceplate
feed box (on quick-change gear lathes)
feed gears
feed mechanism
feed reverse
feed rod (large lathes only)
filing
finish
finishing cut
finish all over
firm-joint caliper, outside and inside
fluted center reamer
follower rest
forced (or drive) fit
gauge
gang tool
gap bed
geared head lathe
gear progression
gears gear-stud
half nut
half-nut handle
hand feed
hand wheel
hanger bearing
headstock
headless safety head
heating
hermaphrodite caliper
high-speed cutter
high-speed steel
high spots
hook scale
independent jaw chuck
index plate
indicator
individual drive
initial
intermediate gear
keyhole caliper
knob
knurling — coarse, medium, fine
knurling tool
lacing
lard oil
lead screw
left-hand thread
left-hand tool
legs
line shaft
live center
locking bolts
lock-pin feed
longitudinal
loose pulley
machined
magnetic chuck
mandrel
master taper
maximum
mesh
micrometer
mill file
minimum
Morse taper
motor driven
mount work
multiple threads
necking tool (finishing also)
nipple chuck
off center
offset
operator
parallel
peripheral speed
pinion
pipe center
pitch
plain turning
plug and ring gauge
polishing
power feed
press fit
quadrant
quick change
rack
rate of speed
reaming
reference marks
relieving
reverse gear
reverse lever
reverse work
ride
right-hand tool
roughing cut
round-nose tool
r.p.m.
running fit
saddle
scale (for measuring)
scale (on stock)
self-centering chuck
set over
set at zero
shifting rod
shrink fit
side rake
side tool, left and right
side tools, left and right
sleeve-drill bushing and collet
slide caliper
sliding fit
snap gauge
speed lathe
spindle
spindle speed
split nut
square center
square-nose tool
steady rest
stock
straight turning
stud
surface gauge
swing
swivel
T-bolt
T-slot
T-wrench
tail-stock base
tail-stock clamp
tail-stock lever
tail-stock spindle
taper
taper attachment
taper gauge
taper per foot
taper turning
test
thread-chasing dial
thread gauge
thread stop
threads per inch
thread tool
threading tool, bent
threading tool, inside
threading tool, straight
threading, inside
threading, outside
throw out
tight pulley
tool check
tool post
tool-post ring
tool-post rocker
tool-post wrench
tool rest
toolroom
transmission
transfer caliper
tumbler gear
turning shoulders
turning tool, left- and right-corner tool
turning tool, left and right
turning shoulders
turret head
V-block
vernier
V's
ways
worm
worm gears
work centers or axis

Idle Industrial Arts Classrooms

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Planning for greater use of the school shop is one way of reducing waste and gaining greater efficiency.

Recurrent objection to the heavy expense of public education has, in recent years, caused school administrators and school boards to cast about for ways and means of reducing their annual budgets without impairing the efficiency and scope of educational programs. Their action in response to the need for economy may be roughly divided into two modes of procedure.

The first of these occurred during the earlier years of the economic upheaval. Retrenchment, following so closely an era of educational expansion, meant an abrupt about-face in educational expenditure. Ample time for school authorities to proceed in their usual methodic fashion was not available. The cry for reduction of school costs was so insistent that immediate action was imperative.

Hasty examination of annual budgets revealed three obvious major items of expense: debt service, maintenance costs, and instructional costs. The bonded nature of the first of these made reduction impractical. Consequently the latter two were seized upon as logical points for the economy attack.

The resultant effect upon industrial arts was, in general, similar to that upon other divisions of the curriculum. Salaries were lowered and departmental faculties were reduced in number. Supply requisitions were limited. Repair and replacement of worn machinery and other equipment was indefinitely postponed. The sequence of crowded classes working with insufficient supplies and

faulty equipment which resulted in a loss of efficiency and effectiveness of instruction was not surprising. Instruction, the vital part of education, was badly handicapped. Obviously the movement toward economy could not be wholly in that direction.

Recognition of these facts, common to all phases of educational endeavor, was largely responsible for a second and more scientific attack of the economy problem. A casual study of school costs had not uncovered educational extravagance in its entirety. Careful research and study of the costs and values of current educational practices was needed if lasting and worth-while economy was to become a reality. Thus the present moment finds education actively engaged in discovering and discarding certain of its wasteful habits which were not revealed during the earlier period of less cautious economizing.

The industrial arts, as an integral part of public education, must take aggressive action in the elimination of potential extravagance peculiar to its field. This must be done, not only as a protection against future charges of financial carelessness, but as a means of more fully justifying the inclusion of industrial arts in the training of youth.

An example of major extravagance, of frequent occurrence but generally overlooked, is disclosed by a recent comparative survey of industrial-arts departments in certain South Dakota public schools. It shows a surprising waste in the use of classrooms, as is evidenced by a study of Table I. The initial portion of the survey was concerned with

TABLE I

Use of Industrial-Arts Classrooms of South Dakota

	Number of Classrooms Studied	Possible daily Student Accommodation	Actual daily Student Accommodation	Per Cent of Classroom Use	Per Cent of Classroom Non-use
1929-30	35	5246	3872	66.3	33.7
1933-34	34	5087	3109	59.9	40.1

the school year 1929–30. In the departments under study for that year, 35 classrooms with possible total daily accommodations for 5,246 students were found. These shops and drafting rooms, however, were closed during a part of the day so that a daily total of only 3,872 students could be accommodated. The average classroom was open to use only 66.3 per cent of the school day. A consequent loss of 33.7 per cent in the use of available space and equipment was incurred.

With the need and demand for economy so apparent during the following five years, it might be supposed that this wasteful condition would have been corrected or at least improved. A corresponding survey of the same departments for the school year 1933–34 belies this thought. During the latter year, 34 classrooms with possible total daily accommodations for 5,087 students were being used. In actuality these schoolrooms were open for class use on the average only 59.9 per cent of the school day. A daily total of only 3,109 students could thus be accommodated. The loss in use of space and equipment for this year was 40.1 per cent. During five years of the most rigid economy in public education this waste was allowed, not only to continue, but actually to increase.

The schools included in this study, with high-school enrollments ranging from 208 to 1,678, have problems and conditions in common with schools of similar size located in other states. It is probable that this waste is more or less common in industrial-arts departments of many other public schools.

Causes for the above condition are not difficult to locate. Inadequate instructional staffs, resulting from reductions in the number of teachers employed, are perhaps the most common. Industrial-arts teachers have frequently been taken from their departments and assigned to part-time teaching in other fields of instruction, leaving their own classrooms vacant while they were so engaged. Then the present policy of larger classes has made possible the crowding of students into fewer classes with consequent non-use of some classrooms. It is entirely possible that industrial-arts departments in some localities have been overexpanded. This, coupled with other factors, has caused some classrooms to be unused during a part of the day. Some localities have been conscious of a strong demand on the part of taxpayers for a return to the old classical type of public school. Industrial-arts departments in these schools have usually been so reduced in size and scope that some classrooms are not needed. In certain smaller schools the practice of alternating classes from semester to semester has been prevalent. The practice has usually had some bearing upon the use of industrial-arts shops. Loss of student interest, cost of materials to the student, and lack of departmental advertising are other causes resulting in vacant classrooms.

Direct statement concerning the loss occasioned by this waste must be postponed until further research and study of the problem has been made. It is not difficult, however, to indicate in a general way, where these losses occur. The results and effects are rather evident.

First the public fails to get a full return on its investment. The expense of equipping a shop or drafting room is comparatively large, even after the room itself has been provided. A classroom, as an investment, pays dividends in direct proportion to the constancy of its use. The public purse suffers further loss, in that heat, insurance, and upkeep costs continue even though a classroom is unused during a part of the school day.

The student also must be considered. When classrooms are closed, classes elsewhere are of necessity enlarged. This means a twofold loss for the student. He loses the opportunity and experience of working with equipment and subject matter peculiar to the closed classroom, and at the same time he is crowded into other classes, already too large, where adequate instruction and understanding are rarely possible.

To the department itself comes a decided loss in prestige. Unused shops appear to outsiders as departmental dry-rot, indicating a laxity in organization and a possible failure to realize upon the wide possibilities of industrial-arts education.

While the problem under discussion is quite general in occurrence, its solution is of local character, requiring study and correction by local school authorities. Certain remedial suggestions, however, may be made.

In many cases the employment of an adequate teaching staff is the best procedure. This is particularly advisable where classes are so badly overcrowded that efficient instruction is impossible. In some other cases where departmental overexpansion has occurred, it is perhaps best to reduce the department to normal size and open classrooms so vacated for other types of educational work. In certain larger systems where the school is operating in several buildings, it might be wise to concentrate all unused classrooms in one building and then close or sell the empty structure.

Other plans for utilizing industrial-arts classroom space and equipment during unused intervals in the school day may be suggested. Art classes find the light and equipment of most mechanical-drawing rooms quite appropriate for their work. Bookkeeping

(Continued on page 310)

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

J. J. Metz, Editor

A Worth-While Youth Movement

One of the by-products of the economic upheaval from which the country is slowly emerging, is the growing interest which industry is taking in the development of industrial arts and vocational education. This is especially noticeable in those communities where the larger industrial firms are located. As an illustration of this, the plan recently announced by Mr. Frank Cody, Superintendent of Schools, Detroit, Mich., may be cited. According to the information received, a joint meeting attended by educators and representatives of various branches of industry was held. The outcome of this conference was the appointment of an advisory committee looking toward the formation of a gigantic boy's organization that will supplement the work of the schools by encouraging youths in a study of the crafts. It will resemble somewhat the work of the Junior Mechanics of America, with the additional incentive of having industry behind the movement. The movement also is patterned after the Fisher Body Craftsman's Guild, although its intended services are to be rendered on a very much larger scale.

Out of all of this will come a better understanding between business, industry, and the school; a better understanding of industry obtained at an earlier age by the youth of our land, and a better basic knowledge of society in general.

According to Mr. Cody, the consensus of opinion among the heads of many large manufacturing concerns whom he has contacted, is that craftsmanship is more important today in this industrial age, than it was even in the days when everything was produced by hand. It is the opinion of these industrial leaders that only those who possess both manual skill and technical knowledge can hope to be successful in our present mechanical age.

The necessary consequence of more widespread dissemination of industrial arts and vocational education, however, is not only to further the acquisition of economic competence by the individual. More and more do people recognize the real value of hobbies, and that out of hobbies opportunities and vocations may grow.

This is evidenced by some of the results that grew out of the work done by members of the Fisher Body Craftsman's Guild. The General Motors Corporation started this educational venture in 1930. To date, the guild's membership totals 1,100,000, and a number of $5000 university scholarships have been awarded annually to those who have excelled in the model-coach-building competition.

Among the 45 youths who were successful in capturing these coveted prizes in the first five competitions, there are those who still continue with their hobby of model building.

There is E. Stanley Knochel, Jr., of Baltimore, Md., for instance, who now specializes in the construction of model airplanes and motorboats.

Gordon L. Drummond of Washington, D. C., is in his fourth year at the University of Michigan, and takes pleasure and pride in constructing home-workshop machinery and appliances.

Donald C. Burnham, of West Lafayette, Ind., builds boats and power plants for them.

Franz Ibisch, Columbus, Wis., has designed and built a streamlined iceboat.

Charles W. Gadd, Spokane, Wash., has built a mechanical integrator for use in his mathematical work at the Massachusetts Institute of Technology.

Raymond S. Doerr of Battle Creek, Mich., spends his spare time studying violin construction, and Howard Jennings of Denver, Colo., Myron Welb of Arkansas City, Kans., Raymond A. Smith of Lawton, Okla., all have chosen the playing of musical instruments as their avocation.

These young men, some of them college graduates, have still preserved the hobby spirit which they imbibed from their guild activities. That spirit, promulgated by the youth movement fostered by Superintendent Cody, will do much to help our American youth to acquire a training that will prove invaluable in later life, both for making a livelihood and for spending their leisure.

The School-Shop Visit

The new school year brings to the shop teacher numerous additional duties besides that of teaching. One of these is the visiting of schools to study the methods followed by other teachers.

Not every shop teacher is fortunate enough to have time off for making visits of this kind, though much may be gained from this practice. Those who do have the opportunity to make these inspection trips, either in their own school system or elsewhere, should carefully consider how they make them with greatest benefit to themselves and to the students who eventually are to profit by the shop visits which their instructor makes. These visits can be productive of much good if they are made in the proper manner, but they may also represent a great deal of wasted time if the one making them has the wrong attitude.

The Biblical injuction "Seek and ye shall find" holds good also for the teacher-visitor in the school shop. If one is anxiously looking for worth-while new ideas, they will be found; if one looks for faults, they also can be located. The teacher who wants to profit from his shop visits should, therefore, concentrate, not on the job of finding where the other teacher fails but rather where he gains his successes.

Another outcome of these visits is the formation of friendships with men who have similar interests, and are following practically identical pursuits. Brutal frankness in pointing out shortcomings discernible in teaching method or shop management is not likely to act as the beginning of a "lifelong friendship." On the other hand, glaring mistakes can be tactfully pointed out and a scheme for betterment suggested without arousing enmity. If this is carefully done, not only may new friendships be started, but old ones renewed and continued. Above all, however,

the shop visit will have borne its fruit in abundance because not only the visitor, but also the one visited will have profited.

Conserving America's Man Power

The interested man or boy, the one who is always busy at doing something, be it vocationally or avocationally, is usually not the one who gets into trouble with the law. The grave question, however, is: How can everyone be kept busy doing something, under conditions as they are at present?

Again and again, have suggestions been made to extend the scope of the school shop so that it can play a larger part in the lives of both young and old. Some attempts to do this have been made, but even these have been enfeebled by the lack of the wherewithal to make them effective. Yet, the need for assisting those who are not steadily employed or who are not employed at all, to keep themselves actively engaged at something worth while is imperative, if crime is to be kept down.

Statistics have been gathered which show that America is spending fifteen billion dollars a year on its criminals. Prison populations are increasing annually. Federal files list five million persons who have criminal records. Surely, the problem of crime prevention is one that deserves careful consideration, especially by educational leaders whose duty it is to prepare the young for entry into, and the living of a normal life in our industrial society.

Probably industrial arts and vocational education is better fitted to cope with this particular problem than any other phase of education. Not only does the shop teacher endeavor to transmit skills, but he provides his students with that which is needed to interpret life in the industrial era in which we are now placed. Besides the shopwork, the teacher of industrial arts and vocational education gives his students a basic understanding of the scientific laws which underlie so many of the mechanical and electrical aids with which we are surrounded in our homes, schools, stores, offices, and factories. This is a necessary part of the education which the youth of today must receive.

The shop teacher, however, has an opportunity to do more for those under his care, because with his knowledge of industry and industrial occupations, materials, and processes, he can give guidance — occupational, educational, health, and recreational. It is in this phase of his work that he can especially influence the students who come to him. He also can guide them to do correct thinking on the relationship of employer and employee; on the need of the working man to study social and economic problems; on the interdependence of man upon his neighbors; on the fallacy that labor-saving machinery, if properly used, will eventually make the worker unnecessary; on the need of co-operation in society, and many similar subjects.

Above all, however, the shop teacher can instill in his students the love of making things for themselves. He can lead them in making a choice of a wholesome hobby. He can teach them how to use the public library and other available sources in finding out historical facts, interesting things, and technical information, about occupations, hobbies, and the like. He can show them the advantages of joining others by taking membership in the homecrafters' clubs and leagues now coming into existence, which bring those having similar tastes and interests into closer contact. All of these helps will give incentives to the young to keep themselves mentally and physically occupied with activities that preclude antisocial thoughts and actions.

The school shop should, however, go even further. There are many young persons, as well as adults, who no longer are in contact with the school. These, too, especially during the past few years, through enforced idleness may have acquired wrong attitudes, and improper habits. Many of them have found conditions at home distasteful and may have associated with other people who have successively passed through the hopeless stage, to the acceptance of charity, and now are in the belligerent "the-world-owes-me-a-living" stage. Many of these people are in the mood to follow any radical suggestion. Thoughtlessly they abandon themselves to the dictates of leaders who themselves know not whither they are going. Many of these poor unfortunates already have acquired court records, and have joined those who are known as jailbirds and criminals. If someone would help them acquire a new and helpful view of life, many of them might again be changed into useful citizens. To do this would require much effort, and it seems that the school, and especially the school shop, is one of the best agencies for reconditioning these lives. The school shop has so many appeals for these men who, in most cases, through no fault of their own, have been brought so dangerously near the line that separates the good from the dangerous citizen.

When and how this activity for these men can be carried on in the school shop will depend upon local conditions. In some communities, it has been found quite practical to have adults and boys of school age mix without causing trouble. In other places, the shops will have to be opened for this type of students after school hours, Saturdays, and evenings. All of this will involve many problems for which solutions must be found, but this extra trouble should be and must be accepted by the school if it is to live up to its commonly recognized objective of preparing man to take his position in society.

It may be argued that none of the methods suggested in the foregoing are new; that all of them have been used, some in one community, some in others; that in some cases they have even been used in their entirety. All of this is true. It also is true that in every instance where the work was conducted in the proper manner it has proved its worth. But it also is true, that in every instance the number of cases affected has been very limited.

In order to make this work effective, it must be extended far beyond anything that has been attempted up to now. That is the problem that confronts the school and the school shop. That is the problem that clamors for solution. That, also, is the problem that must be solved if the prison populations are to be decreased and if our American Youth is to be really educated to take its place in our present-day civilization.

(Continued from page 307)

taught in the same sort of classroom is entirely possible. Simple attachments to hold drawing boards on woodwork benches make it possible to conduct mechanical-drawing classes in the woodwork shop of smaller schools not requiring two full-time classrooms. The use of shops during vacant hours for adult education or hobby centers fills a need common to many communities.

The foregoing discussion touches but one of the "educational loose ends" frequently overlooked by school administrators and school boards in effecting economy in industrial-arts departments. These individuals have neither the time nor the intimate acquaintance necessary for discovery of less apparent wastefulness. The greater share of the burden rightfully descends upon those within the industrial-arts field. As directors and teachers they are in closest touch with values and problems relating to their own work. Their challenge is clear. Economy reforms in industrial-arts education are their responsibility.

Progress Cards Instead of Report Cards

J. Allen Morris
Murray Vocational School,
Charleston, South Carolina

Making report cards intelligible to parents and prospective employers should be the aim of every teacher, especially those interested in industrial arts and vocational education.

Murray Vocational School in Charleston recently adopted a system of progress cards for all related subjects, doing away with the vague alphabetical and numerical grades of the old type of report card, and substituting instead progress cards for each subject, with definite objectives arranged in "job" form, naming each important skill, habit, operation, and accomplishment, designed to be punched when satisfactorily learned, done, or mastered.

This system combines the best features of the familiar "shop cards" and the "minimal essentials" plan of instruction. Though we do not advocate the use of our system in schools preparing students chiefly for advanced courses in colleges, we find it very well suited to boys whose prime interest is learning a trade and who take related subjects as additional educational equipment. Although the application of work cards and minimal essentials combined is not very widely made in trade schools, yet it can be justified on the grounds that they are both well established and fundamentally sound.

The advantages of the new system may be realized by comparing the report card containing a small space in which is written the numerical or alphabetical grade for each subject (English, 67; History, 71, and so on) with a card which goes home with the punched proof that Jimmie has studied and *can write* satisfactory business letters of the following types: (1) application, (2) ordering goods, (3) collection, (4) selling, (5) itemized bill, etc., or compare it with the punched statement that the boy knows how to advertise for work and help; how to use checks, promissory notes, money orders; how to go about choosing a lifework; has reported on at least one book on "occupations" and has interviewed one man actually working in the boy's chosen vocation.

When an employer asks to see a boy's record, he is shown the shop card showing what the boy has done and can do; from these he secures a fairly good idea of the boy's future working value. No one today disputes the value of English and related subjects in modern business life; no one can sanely doubt which a prospective employer prefers: the "67 in English" or the actual record of work done, of skills learned, of habits formed, of effort expended. With the old report, the employer can merely guess the extent of the boy's application and learning; with the new cards any business man can see at a glance things which help him estimate the boy's working character, speed, attitude and achievement. This fact alone justifies a change in report cards.

No boy fails in Murray Vocational School. We think this a material improvement over the old hit-and-miss system of passing most of the boys in each class and "flunking" several who for various reasons did not or could not finish their work satisfactorily. The psychology and effectiveness of the wasteful and inefficient "failure" method, at best, seem dubious. Many of those who passed their examinations "crammed" for them, cheated, or passed simply because their grades somehow managed to scrape over the passing-grade level. On the other hand, many of those who failed did so because of reasons beyond their own control. Nevertheless, they are branded "inferior" in their own eyes, as well as in the eyes of their classmates, parents, and friends.

Too many boys leave school unprepared to do competent work. Then they and their employers blame the schools and the teachers for allowing them to enter business life before they have learned and acquired the fundamental principles demanded by modern economic conditions and business methods. In our school, therefore, each boy keeps on working on his cards until he completes them or becomes 21 years old, and so leaves the school. Individual differences in speed and ability, also are taken into account, and no boy is rushed through work that he does not understand. He stays with each job until it becomes a functioning part of him, then he starts on his next objective. His attempts are recorded in a "trials" column on his card, just as his shopwork is shown. When he completes one card he starts on another; when he finishes his last class card, he files it with his shop cards and works in the shop until his work there is completed.

The old idea of finishing in four years or being labeled a "flunker" is over. Sickness, accidents, work, numerous less respectable excuses may be responsible for making a boy miss classes at school. Formerly some of these boys were promoted anyway, others were kept back a term or a year. Now they simply pick up their work where they left off, and go on until they complete it. No stigma is attached to a boy's taking more than four years to get all of his cards punched. Quality of work done and permanency of retentive learning we consider far more important than the amount of time taken to complete the work. The cards are, of course, so arranged that boys with sufficient mentality, who work hard enough can finish their course in four years or less.

You may wonder what the boys think about the new system. The good students like it, for now they can finish their academic work unhampered by slow-witted, lazy, or shiftless classmates.

The students now get credit for work actually done. Their record shows exactly what they did and how they did it. They can now devote more time in their senior year to trade training in the shops. If interested in academic work, they can earn extra credit in the form of a better "Instructor's Comment" on their cards. If anxious merely to do well all that is required, they can advance more rapidly than ever before without loss of actual learning. The new cards give special privileges and advantages to those doing good work — that is why the students like the new system.

Middle-class or "average students," going at their own rate of speed, complete their cards in approximately one term — half a year. Already many are showing an improvement in their work, trying to finish their cards more swiftly. To do this, they must work more carefully and more accurately than they have ever done before. The inevitable results are better learning, a higher quality of work, and a better attitude on the part of the largest group of students in our school.

Nonworkers discover that the new system has ended their days of cramming for examinations and sliding over into the next class without having done much work and without having learned anything. Some of them — many, in fact — are already forced into working for the first time in years. Those who cannot or will not do the work will no longer graduate to injure the standing of our institution and its graduates. After time has increased their age if not their wisdom, we give them a "dose of twenty-one" and they cease burdening our classes and shops.

Shiftless students and incipient loafers present a difficult problem in every school. Sometimes parents add to the principal's troubles by their mistaken ideas of their offspring's abilities and promise. We show the disappointed, sad, or offended parent exactly what each boy has not done, and also just what he must do before he can advance. Definite things to be done, definite standards for each job, each job punched when finished — these are the things we place before the parent, the boys, or the interested business man. Even the weakest student-worker sees the point. He does what he can and learns to do those things which at first he is unable to do.

Instructors are no longer feared and avoided because they hold the power of passing and failing; they are now valuable sources of information and assistance, guides to the right way to advancement. Boys come to them for help. They are consulted about the things the student does not understand, and learning becomes much more effective because of the increased attention and interest given to it by the pupil.

Homework has been discarded in Murray for years — but boys now ask for it as a special privilege. Boys who formerly left their books in lockers unopened and unread, now come to us asking for permission to take books home to read and study. Boys who used to fail or just barely pass now sit close to blackboards and dictionaries and come back after school voluntarily, requesting special assistance. The difference in attitude is marked, the change almost miraculous.

Sincere and serious teachers may ask suspiciously: "What about the *quality* of the work? Must we sacrifice our methods of teaching on the altars of progressive education? Isn't this just another fad? Is there anything really to be gained by it?" Short and simple are the answers to these very sensible questions: with a background of eighteen years of old-line academic training in classical high-school, college, and university work I can say truthfully and unhesitatingly that the quality of the work is actually improved, that papers come in neater and cleaner, that spelling and punctuation show betterment.

Methods of teaching vary with each individual teacher. It is they who set up the "jobs" — the things to be done, learned, and taught. To the teacher is left the problem of leading, guiding, and teaching. To teach a class as a group is easier for the teacher, but the results of such instruction are neither so good nor is the amount taught so great as we believe they are under our new system. New methods of instruction and testing are easily utilized if the teacher has intelligence enough to make the necessary adaptations; if he lacks this, he could probably not teach well by any method or system.

Our new system is certainly no fad. Our school system is by nature rather conservative — open to new ideas but not likely to leap wildly at every new suggestion. The new system was carefully examined before it was accepted. In its present form it is still looked upon as something tentative which will have to be changed when surrounding conditions make that necessary.

So far as the experiment at Murray Vocational School is concerned, it has already proved its worth. We see concrete improvements, and we know the method has valuable advantages.

The reader may be interested in knowing how to go about making out a set of cards somewhat similar to those used at Murray. The process of gathering the material is long and tedious for a new teacher. For men who have been teaching related subjects for some time, the first step will present little difficulty. The procedure is simply this: gather the things known to be necessary or desirable in a given course of study. Select from these notes the most important — the "minimal essentials" — and arrange them as far as possible in order of difficulty. Mark each job with a number representing the class in which it is to be learned and taught. Arrange these according to types of activity, grouping them under such action-verb headings as "uses, recognizes, learns, studies, reports, writes, knows." Put down on separate sheets the jobs for different classes.

The next step is fairly difficult — or at least so it seems at first. Put into clear, simple, concise terms the activities and objectives, grouping them under the heading of the verbs mentioned above. The last step is the easiest. Secure cards or sheets of heavy paper strong enough to stand punching. The names of the jobs are printed on the cards, leaving on the side of the card two columns, one for a "T" or trial work, and the other for "A" or "accomplished" work. If anyone objects to the two-column arrangement, three columns may be used for grading the work as "fair, good, excellent." We discarded these terms because we felt that a job is either right or wrong, and that no shiftless or sloppy work should be given credit on the cards. A space at the bottom of each card allows each instructor to express in writing any favorable or adverse comments he may have to send home on the report. President Wilson once said in effect that the world does not judge deeds by percentages — that we pay for a job properly and completely done or we let the workman go and get someone who can do the work thoroughly. We pay for work satisfactorily done with a punch that says "accomplished!"

The writer does not claim to be the inventor or discoverer of a new system. There are schools in the United States using something like it right now. Schools using it, however, are not generally trade schools, but academic high schools operated according to the beliefs of the proponents of progressive education. The method desscribed, however, is sufficiently superior to the methods formerly used.

It has more than performed its duties ever since it was adopted at the Murray Vocational School.

A FABLE FOR THE EX-TADPOLE CLASS

Edwin M. Wyatt, Cleveland, Ohio

Twenty froggies went to school
Down beside the rushy pool.
—*An old song.*

The froggies were all lined up along the water's edge where a big bullfrog was to initiate them into the ways of frogs on land by teaching them to climb the steep bank of the river. They were of all kinds of froggies: strong, weak, energetic, slothful, quarrelsome, docile — alike only in that they had all graduated in swimming from the Tadpole School. How different they found the land from the familiar water! They wanted to try their new legs. But the old bullfrog, mindful of his own froggiehood days, sadly wondered how many of his class could be induced to learn the lessons that all froggies must know before they can climb a hill.

He showed them the first steps, and the class started. From the first timid hops, it was evident that it was going to be an almost single-file climb. The river bank was so strange; it was surprising how many fumbled, how many even repeatedly rolled back to the river. True, not all failed to advance; some held instinctively to the ground as they climbed; some slid backward but jumped as they slid; some, with the insistence of the teacher, kept trying — and, too frequently, let themselves slide back for more assistance; some rushed; some plodded. Most of them made the grade by gradually learning the secret of all success: *To dig the toes in after every leap forward.*

A beginning class of boys started drawing (or shop). They were of all kinds, but alike in that they were all prepared by previous schooling for the new subject. The teacher wondered what the outcome of his work with them would be. However, he demonstrated what they were to learn to do, as teachers do, and started the class off. Some followed his directions implicitly, some started to invent new ways, some remembered his suggestions, some forgot, some were fast, some were slow. It was evident from the very start that learning the new subject was going to be an individual matter and no two would learn it the same way, at the same speed, or with the same thoroughness. When the teacher gave a new demonstration, some paid careful attention, some were entertained, some tolerated his interruption of their work, some wished they could play. Some of the boys learned very rapidly; some learned very little.

When the semester was closing, some found themselves ready to attempt the next educational hill; some had to start over — but those who finished creditably had all learned the *great lesson:* To hang on to every bit of instruction as it was given. Like the froggies, they had learned to *dig their toes in* after every hop.

Most the froggies grew up fast;
Bullfrogs they became at last.

A PRINTSHOP CLEAN-UP SYSTEM

Harold R. Johnson, Washington Park High School, Racine, Wisconsin

A modern school printshop has a multitude of supplies and equipment that must be kept in a convenient place orderly arranged. Without needed materials, printers are handicapped in doing their work. In addition to the workmanlike, time-saving feature of orderliness in a school shop, the training obtained by students in keeping the shop neatly arranged is a valuable by-product of shop instruction.

In order to administer a systematic clean-up method, the card shown herewith was devised for the advanced printing students of Washington Park High School. Each student in the class is assigned a cer-

CLEAN-UP CARD — Weeks of .....

Jobs	Students' Names	M	T	W	T	F
Metal Furniture						
Wood Furniture						
Reglets						
Rule and Leader Cabinet						
Sticks and Pica Rules						
Type on Floor						
Stones						
Cases in Order						
Case Rests						
Bindery Table, Drawers, and Books						
Galleys						
Floor						
Drawer Under Stones						
Aprons, Chases, Notebook File, and Tools						
Drying Rack						
Presses						
Ink Cabinet						
Leads and Slugs No. 1						
Leads and Slugs No. 2						
Leads and Slugs No. 3						
Leads and Slugs No. 4						
Leads and Slugs No. 5						
Leads and Slugs Above the Stone						
Washbowls						
Proof Press and Benzine						
Distribute Wrong Fonts						
Floor Around Saw						

Check for Neglect I-A-E-
Check Absences
Signed .....

I = Inadequate
A = Adequate
E = Excellent

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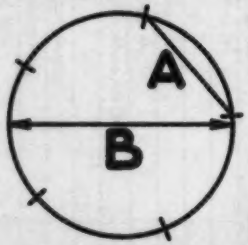
Chords for Spacing off Circumferences

TO FIND THE LENGTH OF THE CHORD FOR DIVIDING A GIVEN CIRCLE INTO A CERTAIN NUMBER OF SPACES, MULTIPLY THE FACTOR GIVEN IN THE TABLE BY THE DIAMETER OF THE CIRCLE. IN THE ILLUSTRATION AT THE LEFT "A" IS THE CHORD AND "B" THE DIAMETER OF A CIRCLE, THE CIRCUMFERENCE OF WHICH IS TO BE DIVIDED INTO 5 EQUAL SPACES.



NO. OF SPACES	LENGTH OF CHORD
3	.866
4	.7071
5	.5878

NO. OF SPACES	LENGTH OF CHORD
21	.149
22	.1423
23	.1362

NO. OF SPACES	LENGTH OF CHORD
39	.0805
40	.0785
41	.0765

4	.7071
5	.5878
6	.5
7	.4339
8	.3827
9	.342
10	.309
11	.2818
12	.2588
13	.2393
14	.2224
15	.2079
16	.1951
17	.1837
18	.1736
19	.1645
20	.1564

22	.1423
23	.1362
24	.1305
25	.1253
26	.1205
27	.1161
28	.112
29	.1081
30	.1045
31	.1012
32	.098
33	.0951
34	.0923
35	.0896
36	.0872
37	.0848
38	.0826

40	.0785
41	.0765
42	.0747
43	.073
44	.0713
45	.0698
46	.0682
47	.0668
48	.0654
49	.0641
50	.0628
51	.0616
52	.0604
53	.0592
54	.0581
55	.0571

tain task for which he is responsible each day. Spaces are provided on the card for noting whether inadequate, adequate, or excellent care was given to the task assigned. This checking service is performed by the shop foremen. The individual clean-up jobs are kept by the students for two weeks in order that each one may become thoroughly familiar with the requirements of his task. At the close of each two weeks' period, the jobs are changed in order that each student may learn how and where all materials must be kept. This rotation also equalizes any inequalities which might exist between the various assignments. Each of these jobs means only a little work for a boy, but when all jobs are carefully done each period of the day, the shop is always clean, orderly, and workmanlike.

A DIRECTORY

Fred C. Finsterbach,
Buffalo, New York

The directory described herewith has been very valuable to incoming students. The boys look upon it as a game, calling it "The Treasure Hunt." As the papers are completed, they are exchanged for grading after which they are returned to the original owners who make the necessary corrections. The papers are then placed into the student's notebooks.

Your Shop

Name..... Class.....

The purpose of this directory sheet is to help you find your way around the shop, to know the names of the machines and their locations, to find the place where materials and supplies are kept and to know more about the shop.

1. On the lines following the letters A, B, C, etc., on the plan of the school shop, list the names of the machines, cupboards, or equipment bearing the respective letters, A, B, C, etc.

2. Number the benches on the plan.

3. The lockers in the corridor are assigned one to every three benches. Place the numbers of the benches in the lockers where they belong.

4. Place an X on the bench assigned to you and also in your locker space.

5. In what direction from the shop is the engine room? (The sweepings from the shop must be carried to the engine room.)

6. The windows of the shop are numbered on the plan. Those numbered 3, 4, 7, 11, 15, are opened for ventilation. Place a circle around these numbers on the plan.

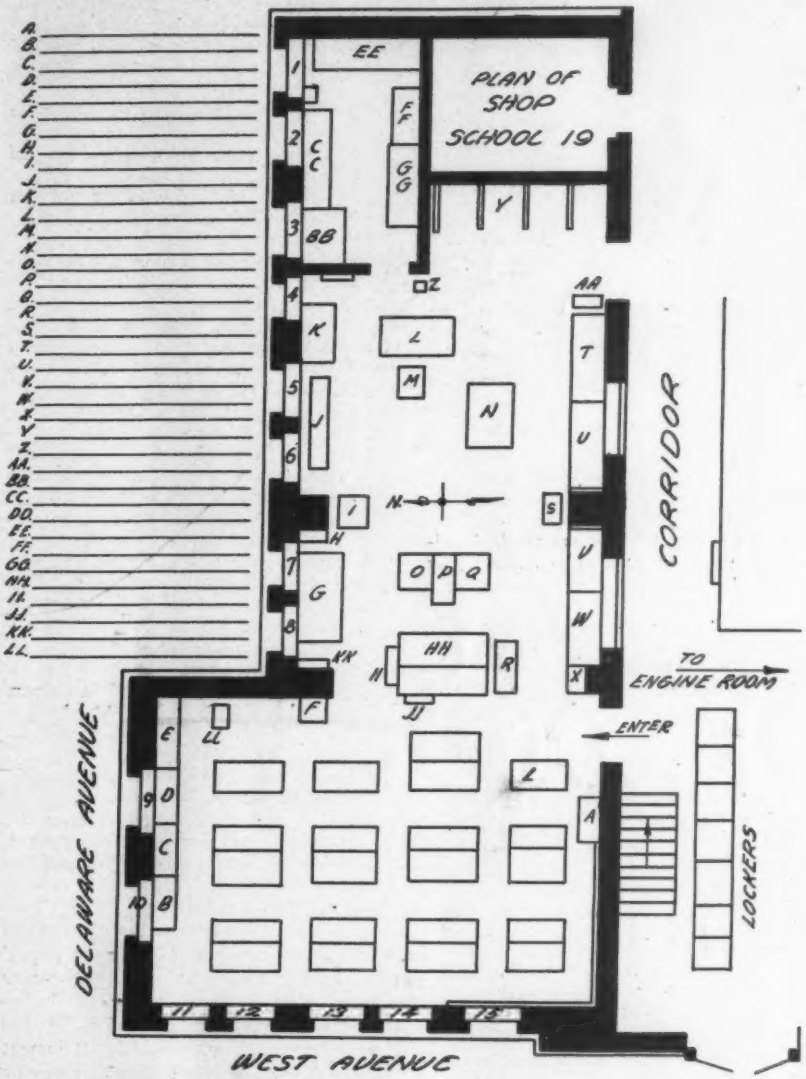
7. The brooms for sweeping the floor are kept on the west end of cupboard B. Write the word "broom" at that point on the plan.

8. Windows 4, 5, and 6, have shades to be drawn for the showing of a motion picture. Place a check at these windows on the plan.

9. In washing up at the close of the shop period, pupils are to line up single file along the south wall facing the sink. Only *one* person at a time is to wash. Draw an arrow to represent this line.

10. If at any time the door to the shop is locked, pupils are to line up single file next to the shop wall in the corridor, facing the stairs. Draw an arrow to show the position this line is to take.

11. When the fire gong rings, stop work and go by way of nearest door to the corner of West and Delaware Avenues.



Turn about and form a double line and return on signal. Draw a dotted line showing the path you would take for the fire drill.

12. What is kept in the boxes beneath the lumber rack?

Answer: .....

13. In which cupboard are kept the nails and screws?

Answer: .....

14. In which cupboard are the coping saw jigs?

Answer: .....

15. What is kept in the three drawers of cabinet P?

Answer: Bottom drawer.....
Center drawer.....
Top drawer.....

16. Write down the aims of industrial arts as given on the sign in the room.

17. List the different activities studied in this shop.

18. What is the wording of the sign printed on the glass of the finishing-room door?

TESTING IN TERMS OF OUR OBJECTIVES

Allen A. Cooper, Roosevelt Junior High School, St. Joseph, Missouri

Every course and every subject should have, if it is offered in the public schools, definite and well-defined objectives and a clear standard of attainment in terms of these objectives. It is desirable to achieve these objectives by stimulating the pupil consciously to realize their importance and to react to their achievement in some definite way. It is also desirable to check on the achievement of these objectives from

time to time. If one agrees to the truth of the statement *The standards by which a course or subject is measured are the objectives of that course or subject,* tests may be constructed in terms of the objectives rather than in terms of the subject-matter content of the course and the skills embodied in the subject.

With this in mind, a method was set up to be used both as a testing and as an instructional device. It is in the form of a multiple-choice test, or better still, a "discrimination" test that will enable the instructor to check up on the development of the pupil in the ability to discriminate between right and wrong and to use his judgment in the making of decisions in everyday life situations.

In the following test, a few of the chosen situations are given, in order that the reader may get an idea of the mechanics, construction, and working of the test. It will be noted in the "key" that the reactions are *weighted*. These weighted reactions are arbitrarily evaluated and it is suggested, since there are no standard weightings existing, that each teacher using this type of test make his own evaluation of these reactions before using it in his own classroom.

THE TEST

Name..... Class ... Hour.... Score....

Following are a number of situations that have arisen, may arise, or are purely imaginary. You will be expected to indicate your reaction to these situations by drawing a circle around the letter in front of the word, phrase, or sentence that you think would be the right thing to do if you were in that situation. For example:

You are walking down the street and meet Mrs. Brown, a very good friend of your family. Mrs. Brown says, "Good morning, George." How would you return her greeting?

1. Just nod to Mrs. Brown.
2. Say "Hello," to Mrs. Brown.
3. Tip your hat and say "How do you do, Mrs. Brown."
4. Don't say anything.
5. Say "Hi!"

The statement 3 is probably the better method of greeting Mrs. Brown, so draw a circle around 3 as required. After the same manner, mark the following situations. You will be given plenty of time in which to make your decision, so study each situation carefully and use *your own* judgment in determining what you would do.

I. John was riding down the sidewalk on his bicycle. He met a man afoot who openly resented giving him any room for passing by on his wheel. This caused John to have to run off the sidewalk and "spill" on the terrace. The man further emphasized his displeasure by saying, "Get that thing out in the street where it belongs!" What would you have done if you were John?

1. Get out in the street.
2. Ignore the man and continue down the street.
3. Argue with the man.
4. Reason with the man.
5. Do nothing about it at all.
6. Say nothing to the man but nurse a grudge toward him.

II. Bill found a dollar lying on the dressing-room floor in the gymnasium. If you were Bill what would you do with the money?

1. Keep the money.
2. Wait for the owner to advertise for it.
3. Turn it in to the lost-and-found department of the school.
4. Give it to the first boy that claims it.
5. Try to keep anyone from knowing you found it, then spend it.
6. Take it and give it to some poor family.
7. Turn it over to your gymnasium teacher.

III. Before you leave the shop for your next hour class, you are expected to clean off your bench and equipment and put things in order. Why are you expected to do this?

1. Because things look better when they are clean and neat.
2. To avoid being called down by the teacher.
3. To make it more pleasant for the next fellow.
4. Because you are expected to do it.
5. To form the habit of keeping things clean and orderly.

IV. George was reading the paper and he saw an article with headlines as follows: "Contract for new bridge let for three million dollars." If you were George, what would you have done?

1. Look for the picture of the bridge.
2. Read the article through.
3. Pass the article by without reading it.
4. Wonder where they are going to get three million dollars.
5. Become interested in the method of constructing the bridge.

V. Suppose your locker partner was that type of person that never straightened up his locker or kept the contents therein orderly or neat. What would you do about it?

1. Tell him to clean it up.
2. Clean it up yourself.
3. Keep your part straight and let his part go disorderly.
4. Let your part of the locker become disorderly like his.
5. Reason with him about the importance of keeping his clean.
6. Report him to his homeroom sponsor.
7. Get angry and quarrel with him about it.

VI. These situations may be extended indefinitely.

Justifying These Situations

Each situation should be carefully selected and designed to test the pupils' reaction to those attitudes and ideals as defined in those objectives of the industrial-arts teacher recommended by the Committee on Standards of Attainment for the AVA. The above situations may be justified as follows:

Situation I was given to test the pupil on objective 5, "To develop in each pupil a feeling of self-reliance and confidence in his ability to deal with people and to care for himself in an unusual or unfamiliar situation."

Situation II was given to test the pupil on objective 7, "To develop in each pupil the habit of self-discipline which requires one to do a thing when it should be done, whether it is a pleasant task or not."

Situation III was given to test the pupil on objective 10, "To develop in each pupil a thoughtful attitude in the matter of making things easy and pleasant for others."

Situation IV was given to test the pupil on objective 1, "To develop in each pupil an active interest in industrial life and in the methods of production and distribution."

Situation V was given to test the pupil on objective 9, "To develop in each pupil an attitude of readiness to assist others when they need help and to join in group undertakings."

Marking the Test

The method of marking this test is objective and easily and quickly done. As will be noticed from the "key," the responses are *weighted*. For example: If in situation I, a circle is drawn around 1, the answer will receive 3 points credit. If the circle is drawn around 2, the answer will receive 8 points credit. If the circle is drawn around 3, the answer will receive no credit or zero. If the circle is drawn around 4, the answer will receive 6 points credit, etc. These evaluations may be changed and re-evaluated by any instructor who wishes to use this type of test. I have merely arbitrarily evaluated the reactions in order to explain the mechanics of the test. Following is the "key."

KEY	KEY	KEY
Sit. I	*Sit. III*	*Sit. VI*
1–3	1–1	1–5
2–8	2–0	2–0
3–0	3–9	3–4
4–6	4–2	4–0
5–0	5–5	5–12
6–0	*Sit. IV*	6–1
Sit. II	1–2	7–0
1–0	2–8	*Sit. VI*
2–2	3–0	Etc.
3–10	4–1	
4–1	5–7	
5–0		
6–1		
7–7		

The advantages of this type of test are as follows:

1. It measures the results in terms of the objectives.

2. It places emphasis on character traits, ideals, habits, and personality traits instead of subject matter and skills.

3. It may be used as an instructional device as well as a check on the student and a test for the group as a whole.

4. The pupil's reactions may be weighted.

5. It places the pupil in the position where he has to make his own discrimination rather than try to discriminate as he would think the teacher would expect him to.

6. The mechanics of the test reduce an almost intangible concept to a relatively objective form, easy to administer and simple to mark.

7. It is more interesting to the pupil than the subject-matter test because it deals with those incidents that confront the average boy in his everyday life.

8. It smacks of those ultimate aims of secondary education which all subjects in the public schools should strive to achieve.

9. It can serve in checking up on "problem" pupils in revealing where their weakness lies to a certain extent.

10. It can be used as a method of gathering cumulative data for the matter of citizenship reports and recommendations.

11. This type of test is not distinctly an industrial-arts test. It may be used in any subject or any field of general education.

The disadvantages of this type of test are as follows:

1. The discrimination that the pupil may make on the paper will not always be the same as he would make should this particular situation become a reality to him: Although it is most generally true that his reactions in both circumstances will be the same.

2. It also measures those ideals and habits that the pupil has developed somewhere other than in the industrial-arts classroom and therefore cannot be relied upon as the whole measure of his success or failure in achieving the objectives. If this test is given as an achievement test, that is, at the beginning and the end of the term in order to determine the achievement, then this disadvantage will not hold true.

3. The "weighted" reactions are arbitrarily arrived at with no sound method of evaluation. This, however, may become an advantage as it is very commonly desired that the individuality of the teacher be considered in instruction and the administration of measuring results. Without standard evaluations to these reactions there is an excellent opportunity for the exploitation of the individuality of the teacher in organizing and administering this test.

The writer of this article wishes to extend his appreciation for the kind consideration given him and the careful criticisms of this test made by the following educators: Mr. Garinger, Principal, High School, Charlotte, N. C.; Dr. Odell, Professor Educational Tests and Measurements, University of Ill.; Mr. F. W. Hebberger, Hadley Vocational School, St. Louis, Mo.; Mr. W. L. Daffron, Principal, Roosevelt High School, St. Joseph, Mo.; Professor R. W. Selvidge, Industrial Education Department, University of Mo.; Mr. Adeylotte, Principal, Elementary School, St. Louis, Mo.

Problems and Projects

YE OLD TOWN PUMP DESK LAMP

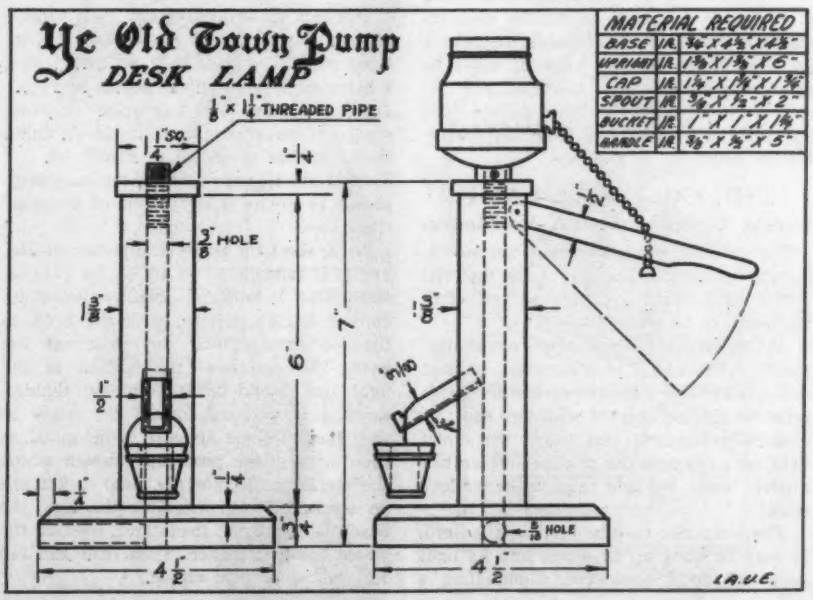
Elwood B. Hovey, Director of Industrial Arts, Longmeadow, Massachusetts

When the Connecticut Valley flood left hundreds of people homeless in the vicinity of Springfield, Mass., we determined to do something for them.

We had been working on a replica of the old town pump which once stood on the green in Longmeadow, and thought it would be a good idea if we made 100 of the replicas in the form of lamps and gave them to the Red Cross to distribute to homeless people. The Springfield Red Cross Headquarters, however, told us that what they needed most was money, so we set to work to make the lamps with the idea of selling them and turning the proceeds over for the relief of the flood sufferers.

We produced the lamp on the "factory plan" out of basswood. After cutting the stock, saw cuts were made in the top of the uprights to provide a place for inserting the handle. This was held in place with a 1¼-in. brad, acting as a pivot. Slots were then made in the opposite side and the spout glued into place. The lamps were then given a coat of maple stain followed by one coat of orange shellac. They were then rubbed lightly with 3/0 steel wool and polished with linseed oil.

The buckets were turned out on the lathe, twelve at a time, sanded and cut off. The insides were removed with a ⅝ in. Forstner bit, on the drill press. They were then given one coat of white shellac. The pail handle was made of a single strand of radio-antenna wire. After wiring, the lamps were assembled, and the pull chains were put through the handles and cut off the proper length. Bulbs and shades added the finishing touches, and the finished product proved so popular we could not meet the demand.



In one week we completed and sold one hundred lamps, permitting the industrial-arts department to turn over $100 to the American Red Cross for local use.

CONSTRUCTION OF VENETIAN BLINDS IN SCHOOL SHOP

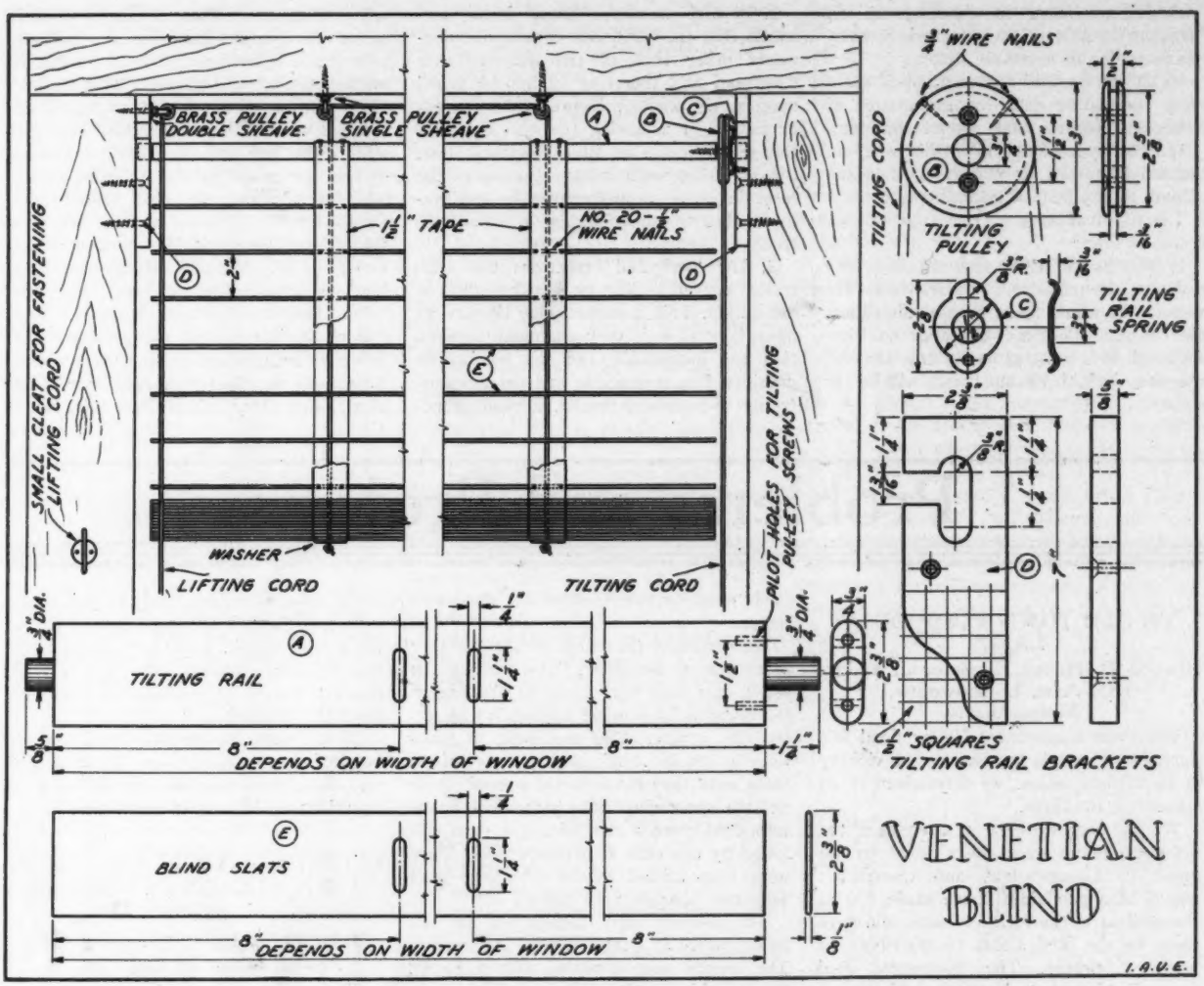
John G. Rohner, Township High School, Johnston City, Illinois

This project developed out of the need for new window blinds for the school, the need for suitable projects for shop students, and the desire for something better than the old cloth blind.

The most economical method for the slats proved to be the use of 1-in. common yellow poplar split into three or four slats per thickness. The steps of procedure for the slats are as follows:

1. Joint edges on rough stock
2. Cut stock to length (net size)
3. Rip the width 2⅜ in.
4. Surface better side
5. Split on band saw or combination saw
6. Hand plane to ⅛-in. thickness
7. Bore holes for lift-cord slots
8. Cut slots with chisel
9. Round edges with block plane or shaper. A special rounding plane can be made for this job
10. Check and sort slats according to color and defects. Defective slats can be cut for smaller blinds
11. Shellac one thin coat
12. One coat clear varnish

The tilting rail, pulley, and bracket require ordinary woodworking processes. Care must be taken to cut the shoulders on



the tilting rail the proper length to fit the desired opening. The ends are best turned on the lathe for a proper fit in the hole on the bracket. The steel spring is not essential, particularly with large blinds as there is enough weight to hold the tilting rail at any angle. The tilting pulley is best turned out on the lathe. A hole is bored in the center to fit over the turned end of the tilting rail. Two screws will fasten the pulley to the rail satisfactorily. The brackets in this case were designed to be fastened to the window frame next to the window stop. For construction on thinner walls where the bracket must be fastened on the casing, the upper end should be designed like the lower end so that screws can be put through into the casing. Two screws properly applied will hold any bracket for blinds. The two lifting-cord pulleys must be so placed that the lifting cord is in line with the slots in the slats. The bottom slat has ¼-in. holes instead of the two slots and is protected with a wood disk or washer. One end of the lifting cord is fastened to this washer by means of a knot. The lower end of the ladder tape should be sewed together, and the upper end tacked to the top of the tilting rail.

For drying varnished slats and assembling the blinds, it is best to arrange a rack or table a little longer than the blinds. A strip of wood with cross cuts made with a thick saw will serve to set the slats on edge for drying. It is advisable to make a jig for boring the slot holes in order to assure uniformity.

The 1½-in. tape, the brass pulleys, and the cord can be purchased from any school-supply house.

THE COLONIAL LAMP

Gerald A. Boate, Seattle, Washington

The colonial lamp described herewith is a general favorite. The cost of the material and finish, exclusive of the socket, cord, and plug, is 25 cents.

As a reading lamp, the cone-shaped metal shade which is hammered, painted dull black, then highlighted, has its inside reflector surface finished with two coats of aluminum lacquer. This sends the direct light rays down to the reading surface like a silver beam. No light falls on the reader's eyes.

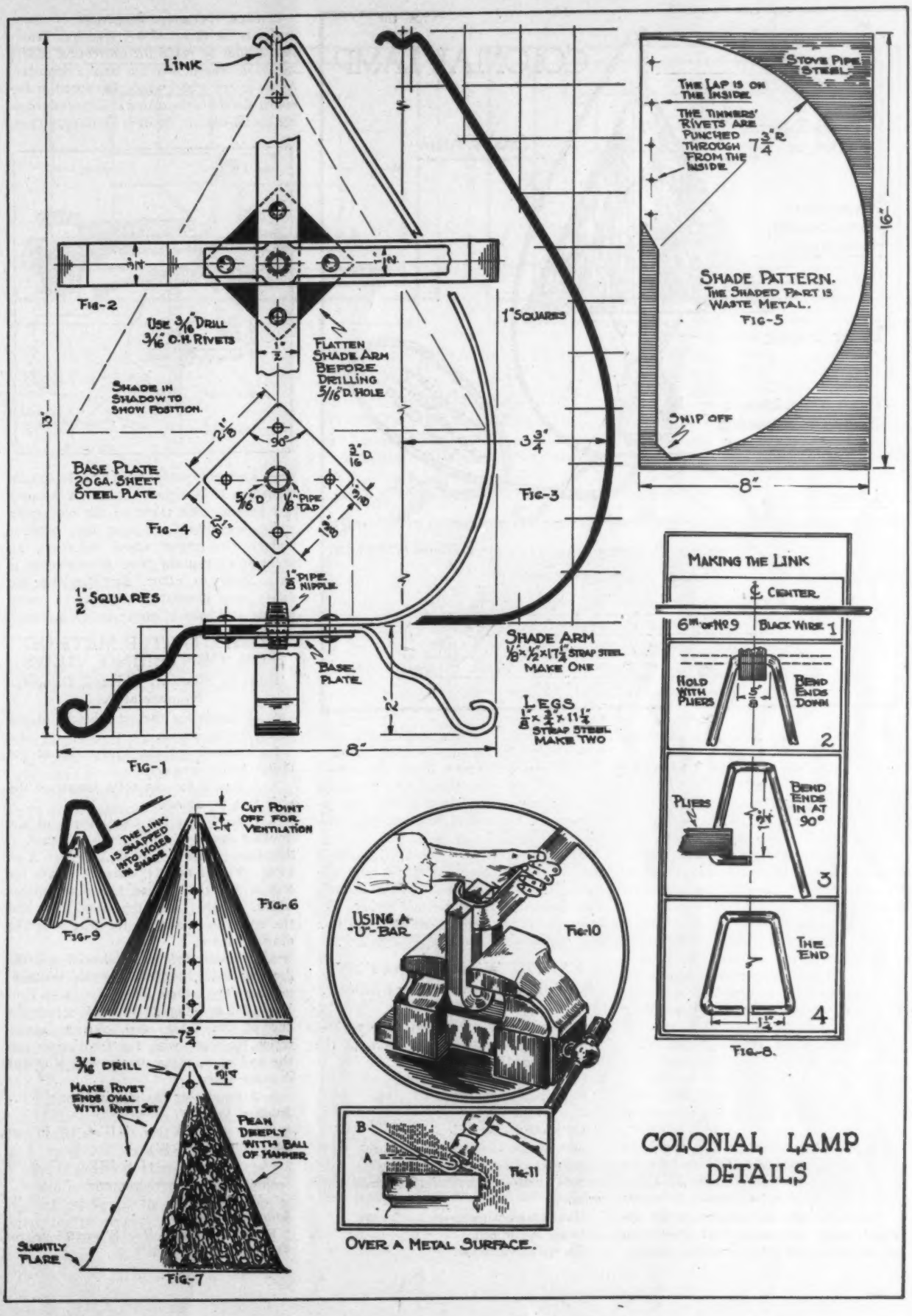
The lamp also may be used as a lantern. It may be hung up anywhere and its light rays will flood downward, illuminating a large circle. With its 12-ft. cord, it also may be used as an extension light.

Method of Procedure

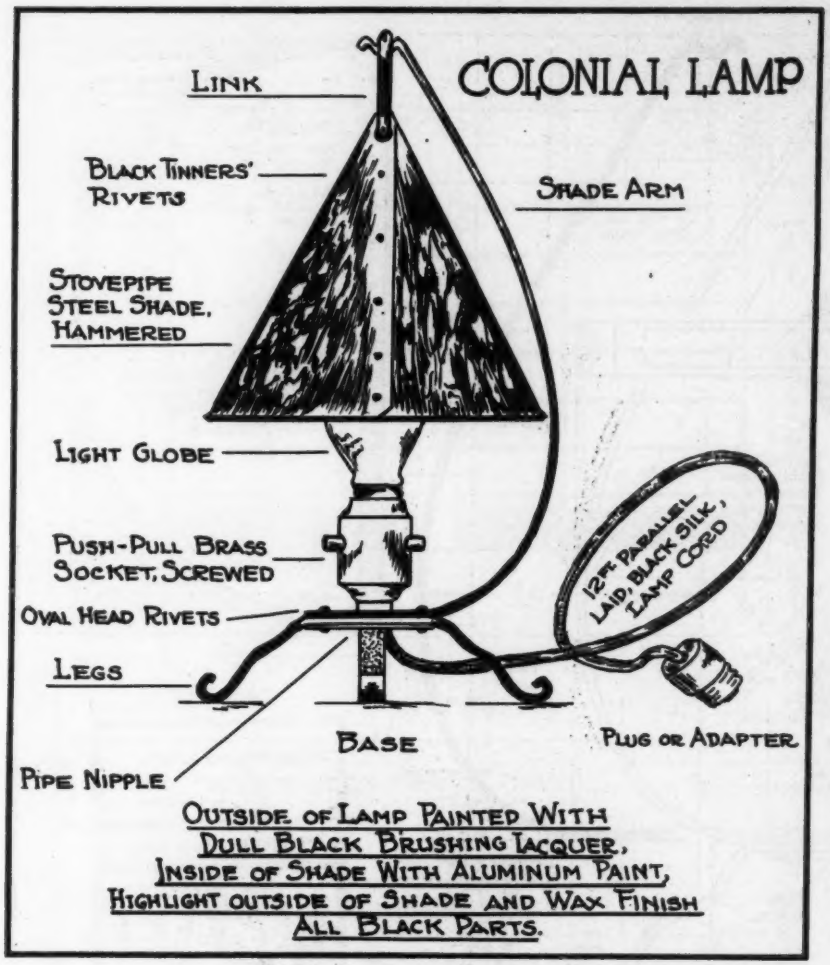
The legs shown in Figure 1 are formed of two pieces of ⅛ by ¾ by 11¼-in. strap steel. The ends may be curled with a hammer on an anvil as shown in Figure 11, or by using a U bar made of ½-in. square stock with the ends drawn quite close together as shown in Figure 10.

After the legs are formed, the base plate shown in Figure 4 is cut out of 20-gauge sheet steel.

Next, form the shade arm shown in Figure 3. It is made of ⅛ by ½ by 17¼-in. strap steel. It must be carefully shaped according to the pattern, with the hook at the top exactly over the center of the base. The center of the bottom of the light arm should be flattened out slightly, drawing it outward toward the edges so that there will be at least ⅛-in. metal at each side of the pipe tap through which the nipple for holding the lamp socket will be screwed. Next, assemble the legs, the base plate, and the shade arm, riveting the whole firmly together. Then drill and tap for the ⅛-in. pipe nipple.



COLONIAL LAMP DETAILS


COLONIAL LAMP
LINK
BLACK TINNERS' RIVETS
SHADE ARM
STOVEPIPE STEEL SHADE, HAMMERED
LIGHT GLOBE
PUSH-PULL BRASS SOCKET, SCREWED
12FT. PARALLEL LAID, BLACK SILK, LAMP CORD
OVAL HEAD RIVETS
LEGS
BASE
PLUG OR ADAPTER
PIPE NIPPLE
OUTSIDE OF LAMP PAINTED WITH DULL BLACK BRUSHING LACQUER, INSIDE OF SHADE WITH ALUMINUM PAINT, HIGHLIGHT OUTSIDE OF SHADE AND WAX FINISH ALL BLACK PARTS.

The shade is made of black stovepipe steel according to the pattern shown in Figure 5. After the metal for it has been cut, place a piece of pipe in the vise with one end extending. Then with the shade held by both hands, with the wide part of the pattern held toward the operator, rub it back and forth over the pipe while pressing gently downward. In this way, the cone is rapidly formed. See that the lap is to be on the inside.

The cone point is next cut off, as shown in Figure 6, and two 3/16-in. holes are drilled for the link as shown in Figures 7 and 9. The shade may now be hammered over a piece of 1½-in. pipe held in a vise, using the ball peen of a ¾-lb. machinist's hammer.

The link for the shade is made of a piece of No. 9 black iron 6 in. long. The method of shaping it is shown in the various steps shown in Figure 8. The final step is to snap it in place as shown in Figure 9.

Hang the shade over the light-arm hook and check the bottom to see whether the cone hangs level. It should then be taken off and slightly flared as shown in Figure 7. Then the entire surface should be rubbed bright with steel wool. It is then painted with dull black brushing lacquer. This will dry in about two hours, after which a fine flat file may be used for highlighting the high spots. Then the outside of the cone may be finished with two coats of floor wax, rubbed to a polish. The inside of the shade is to be given two coats of aluminum lacquer.

At least 12 feet of black silk-covered parallel cord is to be used for wiring. The wiring should be pushed upward through the nipple into the chain-pull socket. The other end of the wire is then attached to a suitable plug and the lamp is complete.

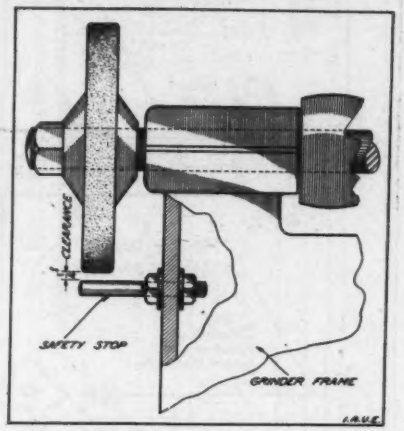
EMERY-WHEEL SAFETY

R. W. Burgett, East Aurora Schools, Aurora, Illinois

The principal causes of emery-wheel ruptures are due to one or more of the following conditions:

Overspeeding.
Improper wheel mounting.
Loose bearings.
Unrelieved side flanges.
Side flanges that are too small.
Side flanges of unequal diameter.
Side blows produced by heavy-duty grinding.
Unbalanced wheels.
Defective wheels.
Excessive vibration.

Perhaps the most dangerous of these causes is the factor of overspeeding. Provision should be made for preventing unsafe speeds on wheels with too large a diameter. As an emery wheel wears, the speed of the motor should be increased if uniform grinding conditions are desired. Manifestly then,



when a wheel is nearly worn out, the spindle is running at its highest speed. If a thoughtless student then takes off the old emery wheel and installs a new one, without making the proper speed reduction, an accident of rupture from overspeeding is very likely to occur. By attaching the safety stop illustrated herewith to emery wheels, accidents of this type are avoided.

COMPUTATIVE METHOD FOR CENTERING VIEWS

Emil E. Shattow, Chicago, Illinois

Nomenclature

1. H stands for the total height of the object to be drawn.
2. W stands for the total width of the object to be drawn.
3. L stands for the total length of the object to be drawn.
4. l stands for the total length of the drawing space, 17 in. in this instance. l, therefore, equals $L + W + X + X + X =$ 17 in. (Figs. 1 and 2), where X stands for one of the three equal horizontal spaces which, together with the front view and the end view make up the length of the drawing space.
5. w stands for the total width of the drawing space, 10½ in. in this instance. w, therefore, equals $H + W + Y + Y + Y = 10½$ in. (Fig. 2) where Y stands for one of the three equal vertical spaces which, together with the front view and the end view, make up the length of the drawing space.
6. S stands for the starting point.

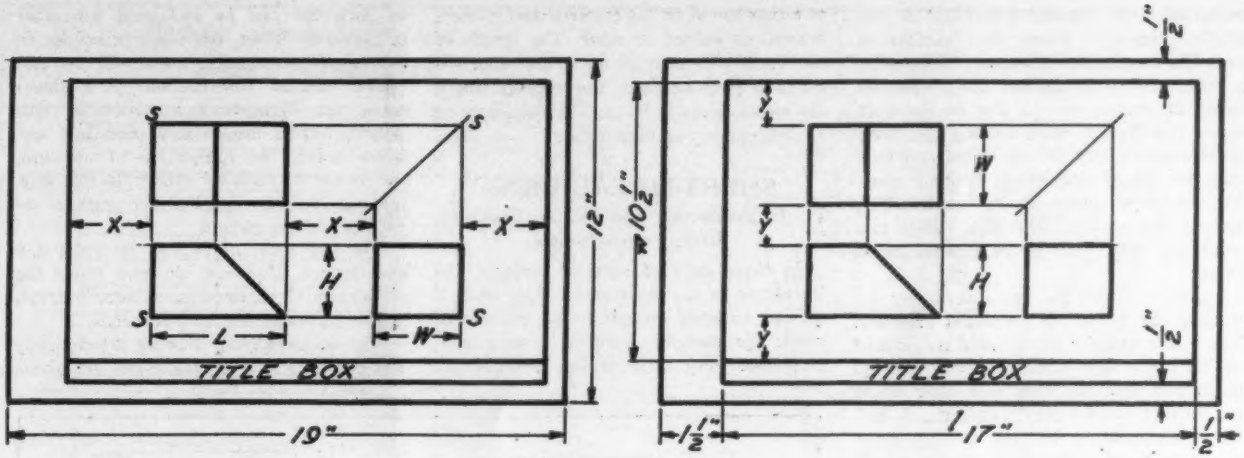
Solution for X:

From (4) $3X + L + W = 17$ in. or $3X = 17 - (L + W)$

Hence $X = \dfrac{17 - (L + W)}{3}$

Solution for Y:

From (3) $3Y + H + W = 10.5$ in. or $3Y = 10.5 - (H + W)$



$$\text{Hence } Y = \frac{10.5 - (H + W)}{3}$$

Example:

Suppose $L = 4\frac{1}{2}$; $W = 2\frac{5}{8}$ in., and $H = 3$ in., then

$$X = \frac{17 - (4.5 + 2.625)}{3} = \frac{17 - 7.125}{3}$$

$$= \frac{9.875}{3} = 3.29 \text{ or } 3\ 5/16 \text{ in. approximately, and } Y = \frac{10.5 - (3 + 2.625)}{3} =$$

$$\frac{10.5 - 5.625}{3} = \frac{4.875}{3} = 1.625 \text{ or } 1\frac{5}{8} \text{ in.}$$

approximately. Hence, the starting point "*S*" for the front view is determined by the two dimensions *X* and *Y*, as is observed from Figures 1 and 2, and has the same location for the other two views.

In cases where dimension *L* is much larger than *W*, the middle *X* and the middle *Y* in Figures 1 and 2 may be taken as ¾ in. each, thus making the solutions for dimensions *X* and *Y* read as follows:

$$X = \frac{17 - (\frac{3}{4} + L + W)}{2}$$

$$Y = \frac{10\frac{1}{2} - (\frac{3}{4} + H + W)}{2}$$

How to Convert Decimal Results Into Their Common-Fraction Equivalents

In determining *X* and *Y* by the formulas given, the results need be carried only to the nearest 16th of an inch. If, therefore, the results obtained are in decimal form, reduce them to the nearest 16th of an inch.

To do this, multiply the decimal portion of the answer by 16. Thus, if *X* equals 3.29, take the .29 and multiply by 16. $.29 \times 16 = 4.64$ sixteenths, say 5/16 in. *X* then is given the value of 3 5/16 in.

It will be still easier to make these conversions readily, if the following table is committed to memory:

⅞ in.	.875 in.	¼ in.	.250 in.
¾ in.	.750 in.	⅛ in.	.125 in.
½ in.	.5 in.	1/16 in.	.0625 in.

A PRINTING-WOODWORKING PROJECT

R. Randolph Karch, Arsenal Junior High School, Pittsburgh, Pennsylvania

It is often thought quite difficult to correlate printing with woodworking. Most industrial-arts courses tie up rather nicely together, as mechanical drawing and woodworking. Printing, however, seems to be an outcast in the industrial-arts family in this respect, which may be one of the reasons why printing is not usually included in the activities of a general shop.

Yet projects may be found that can tie up woodworking with printing. One is the

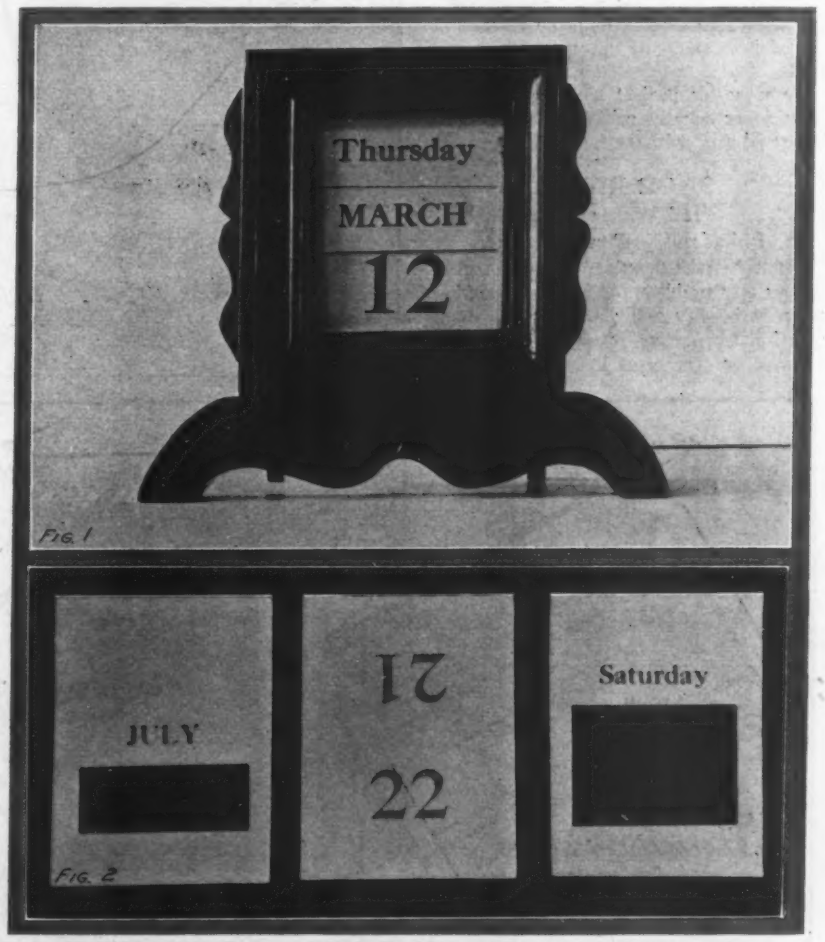


Fig. 1. A perpetual calendar. Fig. 2. Die-cut date, day, and month cards for the perpetual calendar

perpetual desk calendar illustrated in this article. Figure 1 shows the calendar in use. The stand may, of course, be made in a great variety of designs. Each calendar must, of course, have a slot in the back where the die-cut cards bearing the name of the month, day of the week, and date may be placed, preferably behind glass. The stand, of course, is the woodworking end of the project. The idea would also work out very well in the general metal shop.

Figure 2 shows the cards necessary for making the project a perpetual calendar. The twelve months of the year are printed on six cards, one month on each side, so positioned that the type will show up in the correct place behind the glass. A rectangle is die-cut on the press directly below the type so that the days of the month can be seen when the cards are finally arranged together. The 31 days of the month are printed on eight cards, two days of the month on each side of every card. These cards show up better if they are printed in red ink. The third set of cards consist of the days of the week, for which four cards are used, one day printed on each side. This card is die-cut so that the month and day of the week can be seen when placed behind it. Four-ply cardboard is the best stock to use in printing the cards.

Perhaps this project will suggest other correlations between printing and the other industrial-arts subjects.

SHOE RACK

Fred W. Megow,
Philadelphia, Pennsylvania

The shoe rack described herewith makes a very nice problem for the metalworking shop. It is very easily made and is quite practical when fastened to the inside of a closet door. The cross bars may be made of either round or flat material and riveted, brazed, or welded in place. The length of the rack will depend upon the door on which it is to be used. The average length for closet doors is 20 in. The rack may be finished in any desired color.

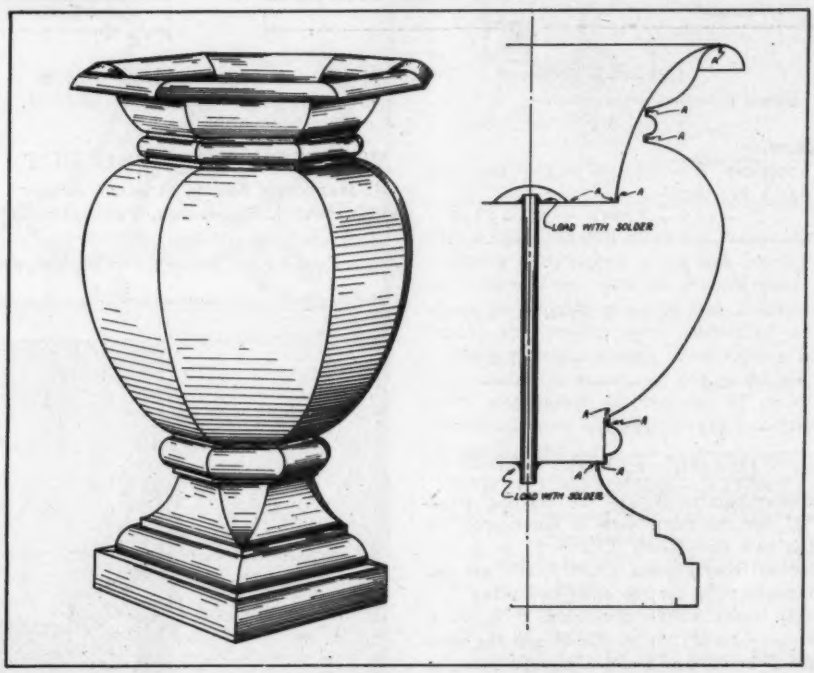
SHEET-METAL URNS

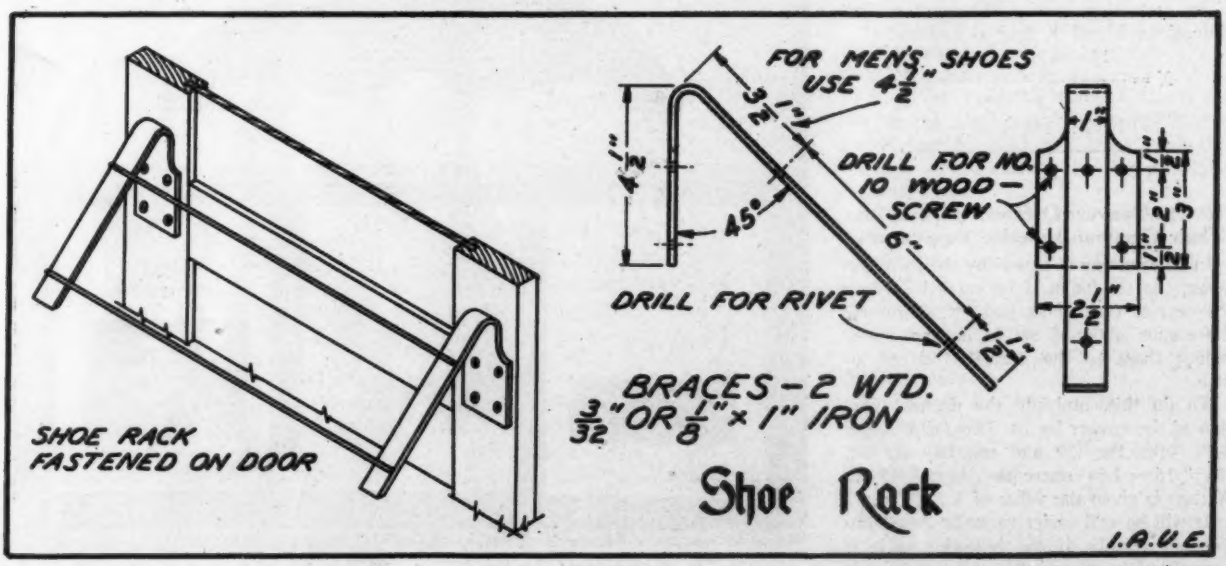
H. E. Andersen and W. A. DeVette,
Erie, Pennsylvania

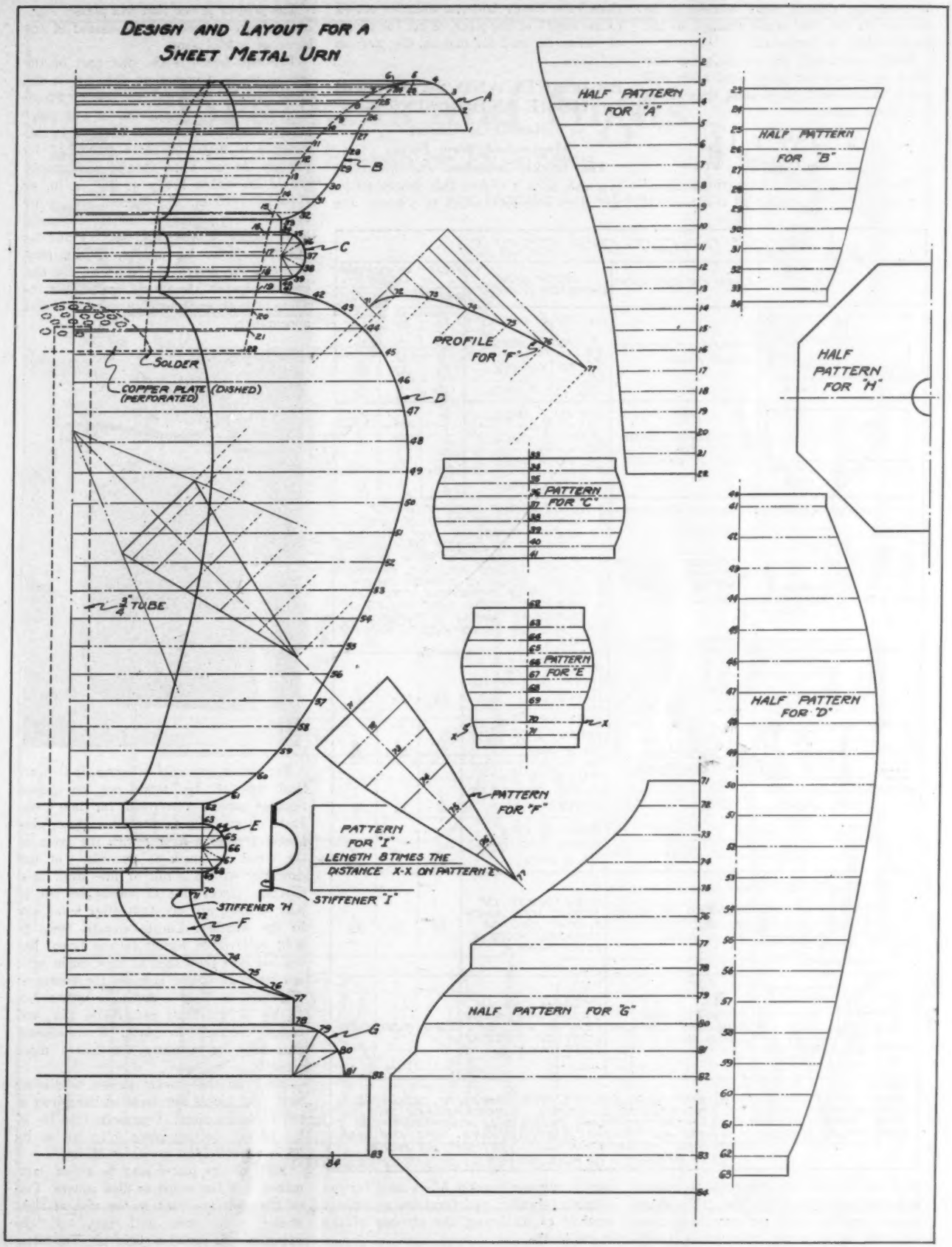
In these days of reduced budgets, the instructor in the sheet-metal shop finds it difficult to bring himself to use his limited stock for exercise work in cornice construction. Very little of the material put to such use can be reclaimed for other projects. However, the same principles to be taught in cornice work will be embodied in the construction of a sheet-metal urn. When such a project is completed, buyers are usually plentiful; and often before the completion of one urn, orders are on hand for others. In this way, material may be supplied for work at no expense to the school.

The urn may, of course, be made any size desired. However, we have found the sizes from 15 in. to 36 in. at 3-in. intervals to be sufficient for all our needs.

The accompanying drawing is practically self-explanatory. No dimensions are given,






DESIGN AND LAYOUT FOR A SHEET METAL URN
HALF PATTERN FOR "A"
HALF PATTERN FOR "B"
HALF PATTERN FOR "H"
PROFILE FOR "F"
PATTERN FOR "C"
PATTERN FOR "E"
HALF PATTERN FOR "D"
PATTERN FOR "F"
PATTERN FOR "I" LENGTH 8 TIMES THE DISTANCE X-X ON PATTERN "E"
HALF PATTERN FOR "G"
SOLDER
COPPER PLATE (DISHED) (PERFORATED)
3/4" TUBE
STIFFENER "H"
STIFFENER "I"
A
B
C
D
E
F
G
X

as each size desired must necessarily be laid out in full, and slight changes in the design might be preferred.

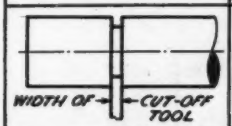
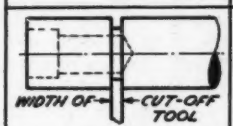
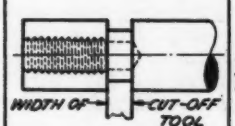
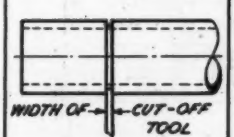
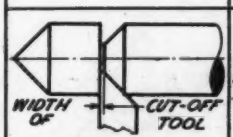
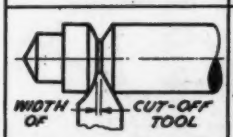
When completed, the urn is given five coats of stone-color paint, and when still wet is sanded with silica sand, thus giving it a stone finish.

CUT-OFF TOOL

J. K. Olsen, Chicago, Illinois

The following table is primarily designed for estimating the amount of raw material required. It also is a fair guide to general manufacturing practices. The table shows general practice only and exceptions must be expected in many cases where conditions vary. Note: Add one width of cut-off to the length of the piece, to get the length of rod to be used for making the piece in question.

WIDTH OF CUT-OFF TOOLS

	FORM OF CUT-OFF	STOCK SIZE DIAMETER IN INCHES	WIDTH OF CUT-OFF IN INCHES		
			BRASS	STEEL	FIBER
	STRAIGHT CUT-OFF SOLID ROD	UP TO 1/8 INCL.	1/32	3/64	3/64
		9/64 TO 5/16 INCL.	1/16	1/16	1/16
		21/64 TO 1 INCL.	3/32	3/32	3/32
		1 1/64 TO 3 INCL.	3/16	3/16	3/16
	STRAIGHT CUT-OFF ROD WITH DRILLED HOLE IN CENTER	UP TO 1/8 INCL.	1/32	3/64	3/64
		9/64 TO 5/16" INCL.	1/16	1/16	1/16
		21/64 TO 1 INCL.	5/64	3/32	3/32
		1 1/64 TO 3 INCL.	1/8	1/8	1/8
	STRAIGHT CUT-OFF ROD WITH TAPPED HOLE IN CENTER	SAME AS ABOVE EXCEPT WHEN SCREW-MACHINE PART IS THREADED CLEAR THROUGH, THE CUT-OFF HAS TO BE AT LEAST THE WIDTH OF 3 THREADS. IN OTHER WORDS, USE THE ABOVE WIDTHS WHEN CUT-OFF TOOL IS MORE THAN WIDTH OF 3 THREADS, AND USE A CUT-OFF TOOL THE WIDTH OF 3 THREADS WHEN 3 THREADS ARE WIDER THAN ABOVE CUT-OFF TOOLS			
	STRAIGHT CUT-OFF PIPE OR TUBING	WALL UP TO 1/16 THICK. O.D. UP TO 1 INCL.	1/32	1/32	1/32
		WALL UP TO 1/16 THICK. O.D. 1 1/64 TO 3 INCL.	3/64	3/64	3/64
		WALL 1/16 TO 1/8 THICK. O.D. UP TO 1 INCL.	1/16	1/16	1/16
		WALL 1/16 TO 1/8 THICK O.D. 1 1/64 TO 3 INCL.	3/32	3/32	3/32
	POINTED OR ROUNDED CUT-OFF SOLID ROD	REGARDLESS OF STOCK SIZE, WHEN FLAT AT END OF POINTED PIECE IS LESS THAN 1/32	1/32	1/32	1/32
	POINTED AND ROUNDED CUT-OFF SOLID ROD	REGARDLESS OF STOCK SIZE, WHEN FLAT AT END OF POINTED PIECE IS LESS THAN 1/32	.020	.020	.020

NOTE: ALUMINUM, TOBIN BRONZE, COPPER, DURALUMIN AND ZINC, TAKE THE SAME CUT-OFF AS BRASS

PHOSPHOR BRONZE, IRON, MONEL, NICKEL, NICKEL CHROMIUM, NICKEL SILVER, AND ALL KINDS OF STEELS, TAKE THE SAME CUT-OFF AS STEEL

BAKELITE, CELLULOID, HARD RUBBER, AND ALL FIBER COMPOSITIONS TAKE THE SAME CUT-OFF AS FIBER

I. A. V. E.

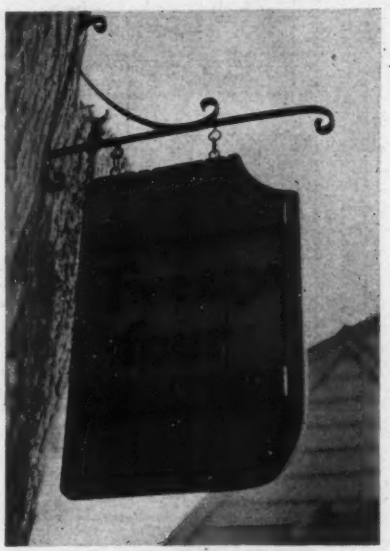
BRACKETS AND SIGNS FOR HOME AND BUSINESS

Harold O. Akeson,
Maplewood, New Jersey

The bracket described and illustrated herewith adds a charm that individualizes and gives a personal touch to a house. The sign or number bracket fills a need for the suburban dweller, and furnishes an artistic method of displaying the number of the home in the city.

The project is one that will please, especially when inexpensively produced in the home or school shop.

The sign board is the first part of the job to make. Cypress or chestnut is the most suitable material to select. Pieces may be tongue-and-grooved, or one piece may be used, if obtainable. The sign in this instance is made of three pieces ¾ by 5½ by 24 in. Both tongue and groove should be rather heavy ⅜ by ⅜ in. or 7/16 by 7/16 in. The battens are ¾ by 1¾ by 14 in. Assemble the three boards. Place battens at the right distance and lag in place ¼-in. lag screws, 1¼-in. long. Transfer the design to the board, cut out, and sandpaper. Imitation cracks can be made at both ends to give weather-beaten appearance.



For either numerals or name, it is practical first to lay them out on paper. Squared paper is convenient for such work. Paste or glue the results on a ⅜-in. pine board, arranging figures with the grain of the wood, as much as possible. Cut out carefully with a scroll or fine band saw. Circular pieces like O should be cut in half so they will not split after being out in the weather. Locate enough holes to hold each piece firmly to the board but not too near the edges, as they might split out later. Drill fine holes in the letters or numerals, at a slight angle, to take a No. 18 by ¾ in. brass escutcheon pin, and fasten carefully in place. A waterproof glue aids in fastening the pieces more securely.

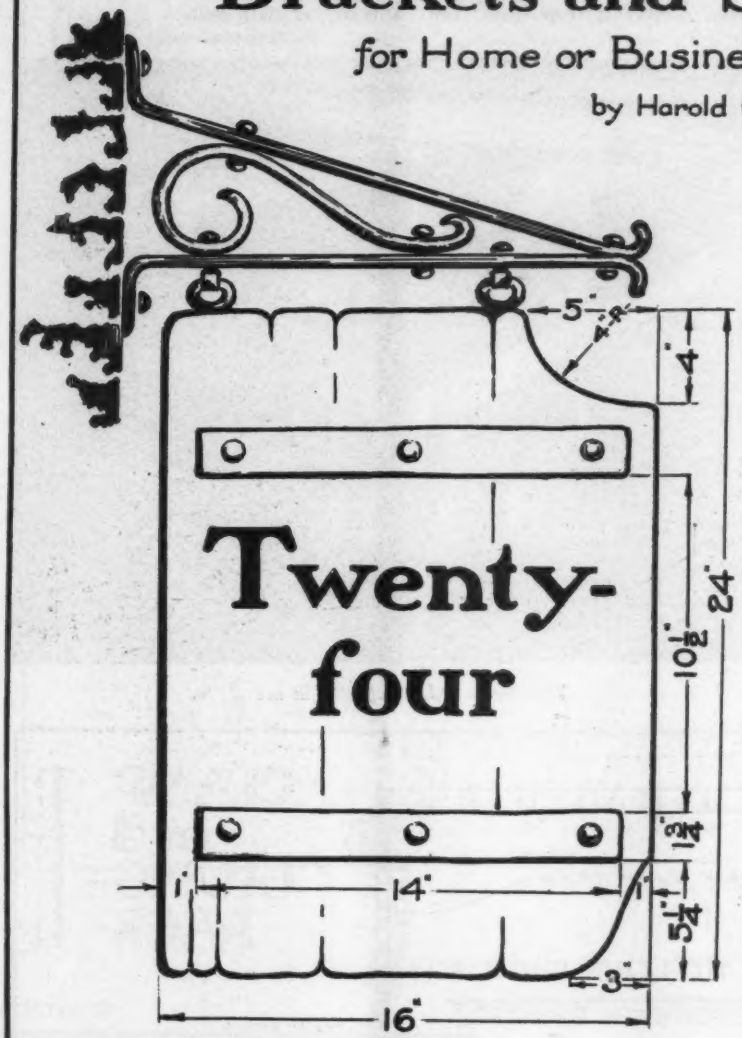
Work on the bracket should be started next. The pieces are made of band iron in the following sizes: Top piece 3/16 by ¾ by 29 in.; bottom piece 3/16 by ¾ by 28 in.; scroll 3/16 by ¾ by 25 in.

Ends of the pieces may be either hammered to a fan shape or filed square. Two of the ends are bent in the vise at right angles, 4 in. from each end, with the opposite ends curled a slight bit. The latter

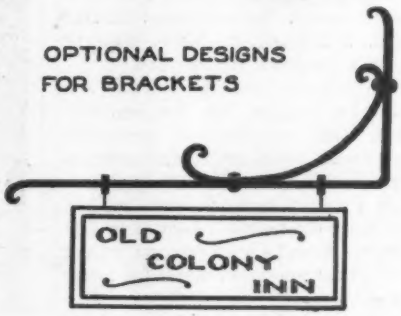
Brackets and Signs

for Home or Business

by Harold O. Akeson

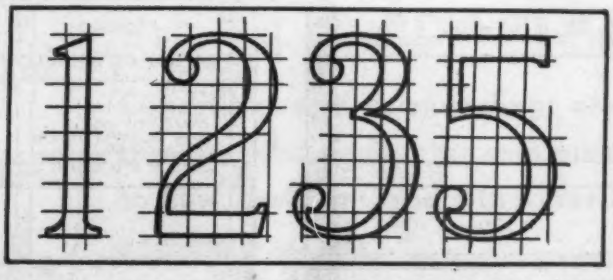


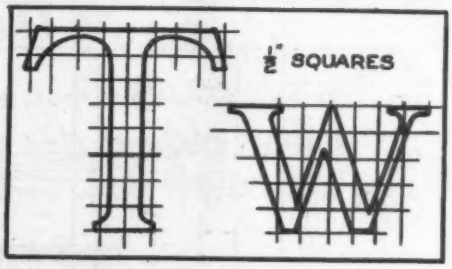
OPTIONAL DESIGNS FOR BRACKETS



BILL OF MATERIAL

No.	Unit	Description
3	pcs.	⅞ × 5½ × 24 CYPRESS
2	"	⅞ × 1½ × 14 "
6		¼ × 1½ LAG SCREWS
6		⅛ × ¾ WASHERS
1	pc.	⅛ × ½ × 29 BAND IRON (TOP)
1	"	⅛ × ½ × 28 " " (BOTTOM)
1	"	⅛ × ½ × 25 " " (SCROLL)
3		¼ × ½ IRON RIVETS
2		¼ × ½ × 2 EYEBOLTS (WITH NUT)
2		¼ × ½ × 2 SCREW EYES





SUGGESTED STYLE FOR LETTERS AND NUMERALS

can be shaped by fastening a 1-in. pipe and the end of iron together in the vise and bending slightly.

The scroll is best made by having a design, full size, drawn on a large piece of wrapping paper. The easiest way to bend the scroll is to use a bending jig or bending fork. Place the iron in the fork, bend it a little, move it a bit further along in the fork, bend it some more, lay it on the pattern from time to time to get the right shape, and so on, until the shape of the scroll is finished.

Locate and drill holes for ¼-in. rivets at points shown in the drawing and rivet the parts in place. The holes for the eyebolts and for the screws with which the bracket is to be fastened to post, tree, or house should be drilled in their respective parts before assembling. Fit the eyebolts in the bracket and the screw eyes in the board. Pry the rings of eyebolts and screw eyes open enough for assembling bracket and sign. The rings, of course, must be closed after the parts are together.

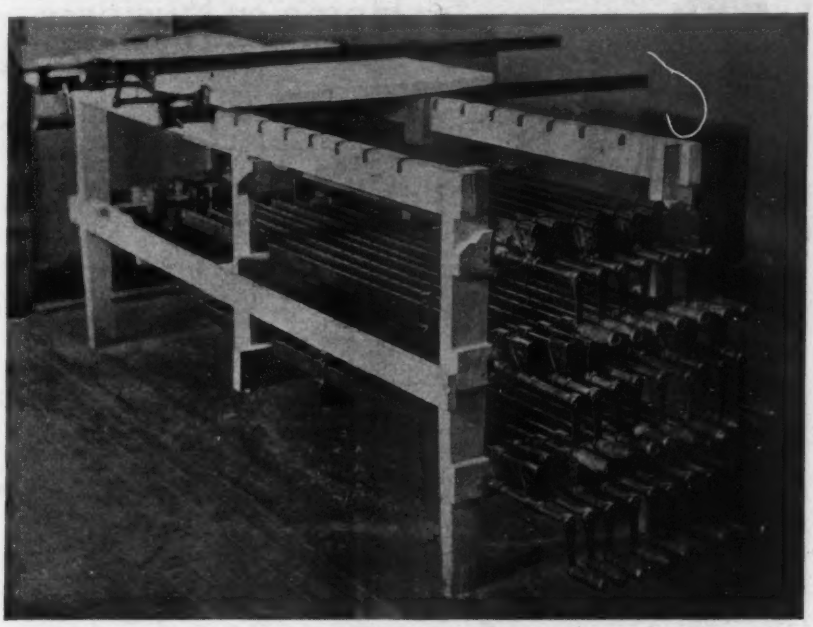
The finish chosen must be one that will withstand the weather. For the parts that are iron, black asphaltum is serviceable and looks well. If the natural iron effect is preferred, use lacquer.

Either paint or a shingle stain may be used to finish the board. A light stain with black numerals and a good grade of varnish covering all the woodwork makes for a very attractive job. Let the work dry thoroughly before hanging for fastening the sign in its permanent location.

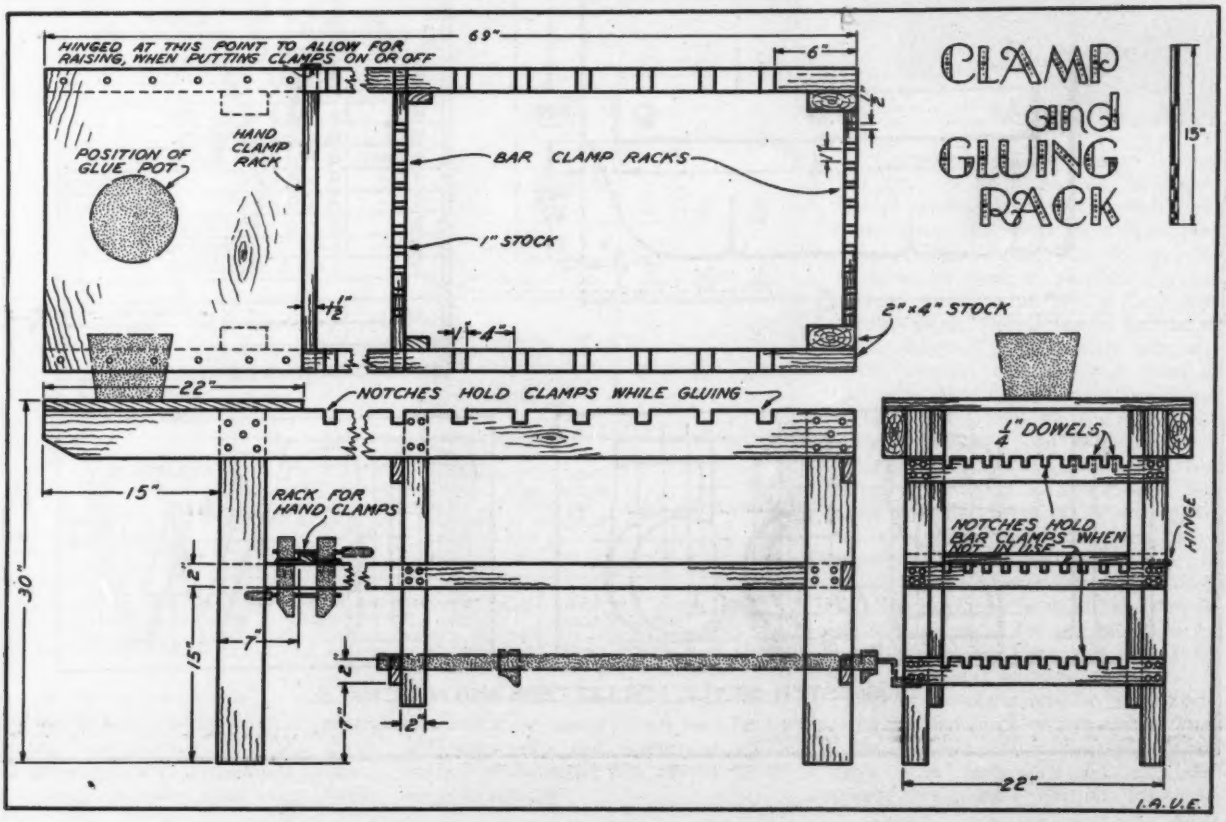
CLAMP FOR GLUING RACK

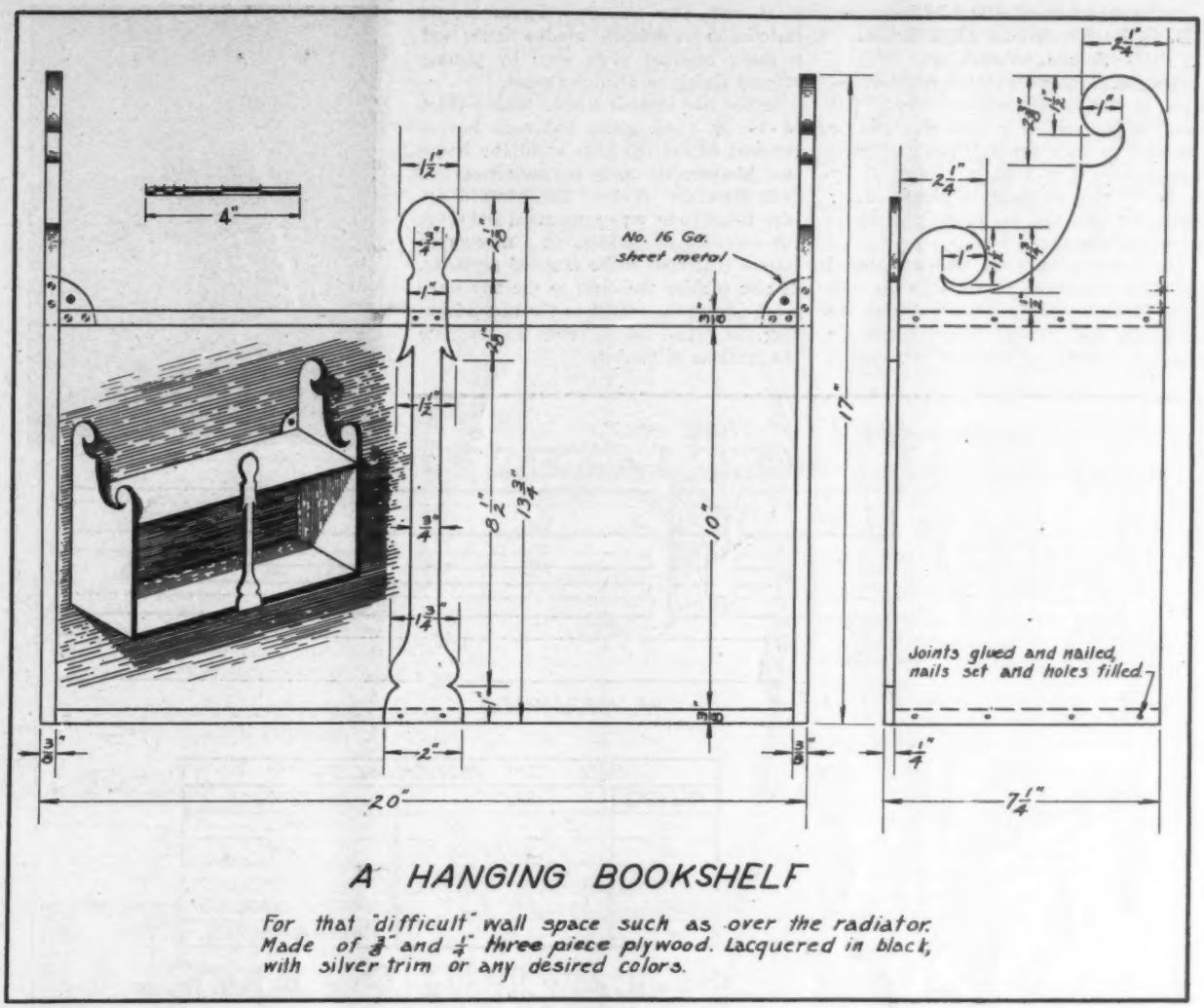
Louis F. Barocci, High School, Cudahy, Wisconsin

The clamp illustrated herewith serves both as a clamp rack and as a gluing rack, in this way, conserving shop space. The rack is best when made of hardwood, preferably birch, oak, or maple. It was at first thought that the clamps in the rack would have to be protected against the glue which might drip down on them during the gluing process, but this has been found to be unnecessary as the glue can be knocked off quite easily.



The clamp and gluing rack in use





A HANGING BOOKSHELF

For that "difficult" wall space such as over the radiator. Made of ⅜" and ¼" three piece plywood. Lacquered in black, with silver trim or any desired colors.

By R. M. Hammes, Council Bluffs, Iowa

FOR YOUR BULLETIN BOARD

POSTER 75 **OCTOBER, 1936**

ADAPTABILITY

Conditions and surroundings are constantly changing, and the one who desires success must be able to adapt himself to new problems and situations as they occur in his social and business life.

© Industrial Arts and Vocational Education

Submitted by Professor L. M. Roehl, Cornell University, Ithaca, New York

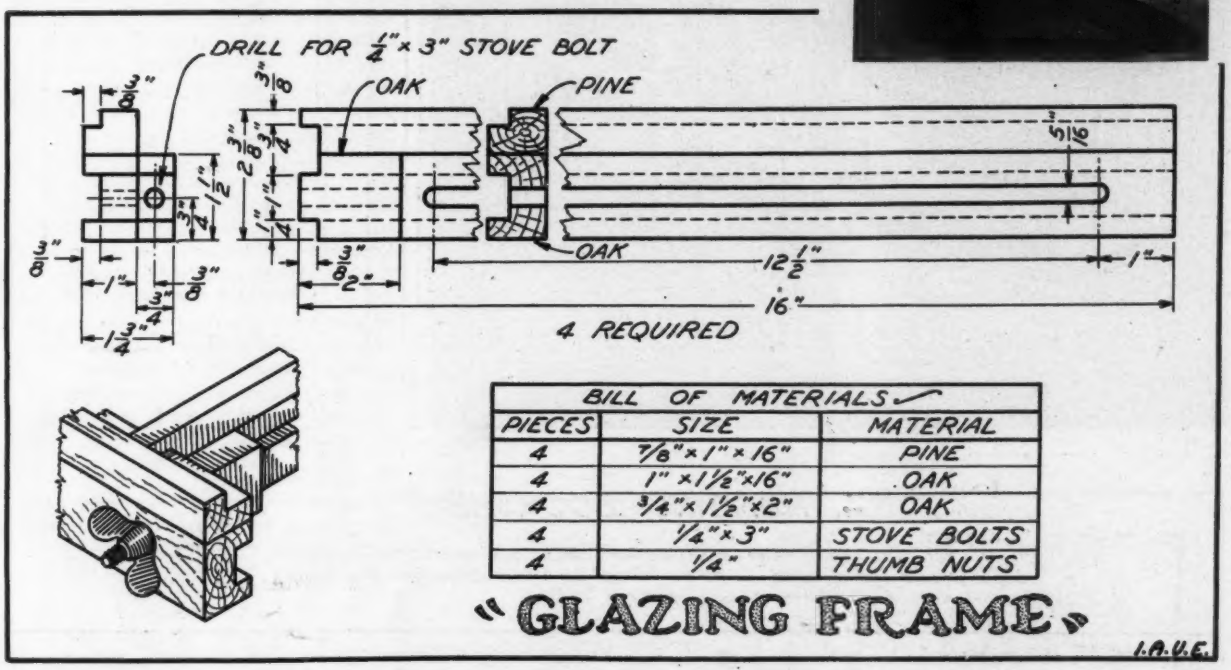
GLAZING FRAME

B. E. Banks, Anoka High School, Anoka, Minnesota

This glazing frame was designed for students in the home-mechanics class. The frame is built up in a form that can be expanded to take any size piece of glass from a piece 4 by 4 in. to a piece 14 by 14 in. It may be built to handle larger pieces, but this size has been found to be handy and practical.

The frame is built up with a rabbeted pine piece glued onto an oak slide bar with a slot through which a stove bolt from the connecting bar passes. This construction makes it possible to contract and expand it at will. The pine top duplicates the material in an ordinary window frame and is easily replaced when worn by planing off and gluing on a similar piece.

In use, the class is started with a piece of 14 by 14-in. glass, and each boy is required to cut the glass to fit the frame as it has been set up by the instructor, and then glaze the window. This method has been found to be very economical and saves the necessity of building up a number of frames that need to be renewed regularly. It also enables the class to use any scrap glass around the school to the best advantage. In actual use it seems to facilitate the teaching of glazing.



BILL OF MATERIALS

PIECES	SIZE	MATERIAL
4	7/8" × 1" × 16"	PINE
4	1" × 1 1/2" × 16"	OAK
4	3/4" × 1 1/2" × 2"	OAK
4	1/4" × 3"	STOVE BOLTS
4	1/4"	THUMB NUTS

"GLAZING FRAME"

I.A.V.E.

FOR YOUR BULLETIN BOARD

POSTER 76 OCTOBER, 1936

IMPATIENCE

A person who is impatient has no place in a field where accuracy and attention to detail are of major importance.

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Submitted by Professor L. M. Roehl, Cornell University, Ithaca, New York

INDIAN SNOWSHOES of wood

PLATE BY W. BEN. HUNT, HALES CORNERS, WIS.

WOODEN SNOWSHOES

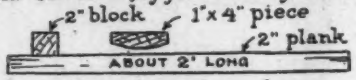
Worn by Indians of Little Whale River, Labrador. In the collection of L. M. Turner from Masons National Museum Report of 1894.

Courtesy of the Milwaukee Public Museum.

• MATERIAL •

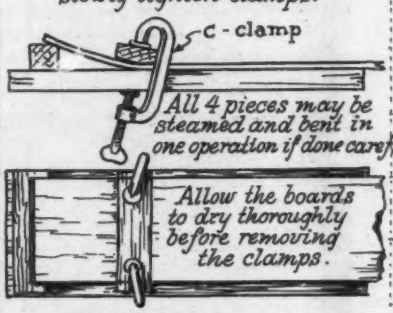
4 pieces of 3/8"x6"x36" straight-grained spruce preferred, but pine or bass will do.
4 pieces of 5/8"x1"x12" straight-grained ash, oak, or maple.
The Indians used rawhide thongs to fasten the crosspieces but soft copper wire will do equally as well.

·1· Make a jig for bending ends.



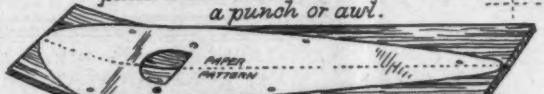
·2· Boil or steam the ends in a wash boiler for about an hour.

·3· Quickly place on jig and slowly tighten clamps.


C - clamp
All 4 pieces may be steamed and bent in one operation if done carefully.
Allow the boards to dry thoroughly before removing the clamps.

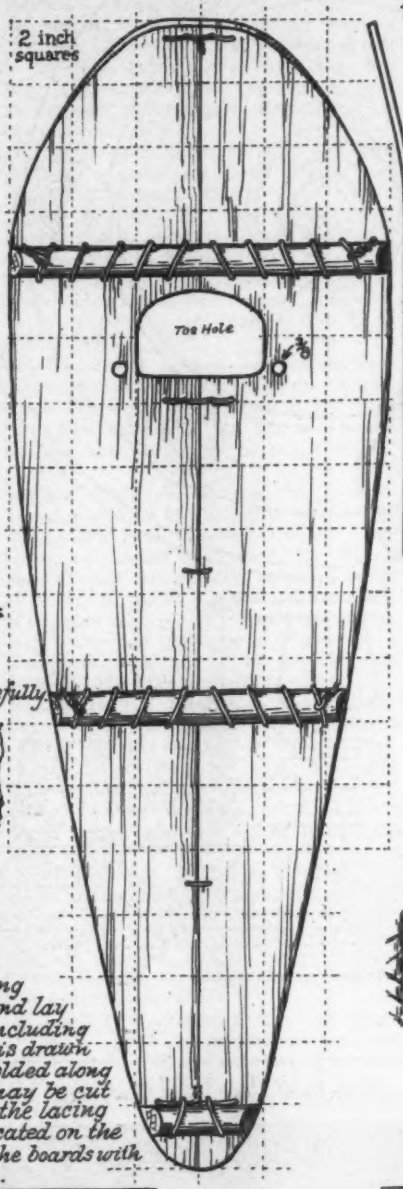
·4· While the boards are drying whittle or plane the strips for the crosspieces to half round.

·5· On a piece of heavy wrapping paper mark off 2" squares and lay out the shape of the snowshoe including toe and harness holes. If one half is drawn carefully and cut out, and then folded along the center line, the other half may be cut exactly the same. The holes for the lacing of the crosspieces may also be located on the pattern and indicated on the boards with a punch or awl.



·6· Lay two of the boards together and place the pattern on them. Fasten it with a few thumb tacks. Mark the outline around the outside and toe hole.
If the harness and lacing holes are marked on the pattern, indicate them as mentioned in 5.

Note - If a few splinters loosen up where the boards are bent, trim them off with a sharp plane.



·7· Cut boards to shape with a band saw, jig saw, or hand saw, or if needs be, a jackknife will do the trick. Cut toe holes.

·8· If the lacing is to be done with rawhide, soak it in water for from 6 to 10 hours before using.
Lay cross pieces in place and draw pencil lines on boards to show exactly where holes are to be placed. Use 1/8" bit or drill and bore holes close to pencil lines.
Or, if soft copper wire is to be used, drill holes just large enough for wire to pass thru easily and drill them on the lines.
Wire about 1/14" thick is just right for this purpose.

·9· Lay crosspieces in place and fasten with a few small brads from below to keep them in place while being laced.

·10· Lace as tightly as possible and fasten wire end by twisting and hammering down.

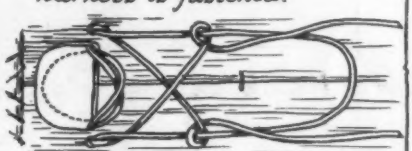
·11· There are 4 places where the boards are fastened together. Wire these also.

·12· Round off all edges and bore 2 holes 3/8" in diameter as shown, for harness fastening.

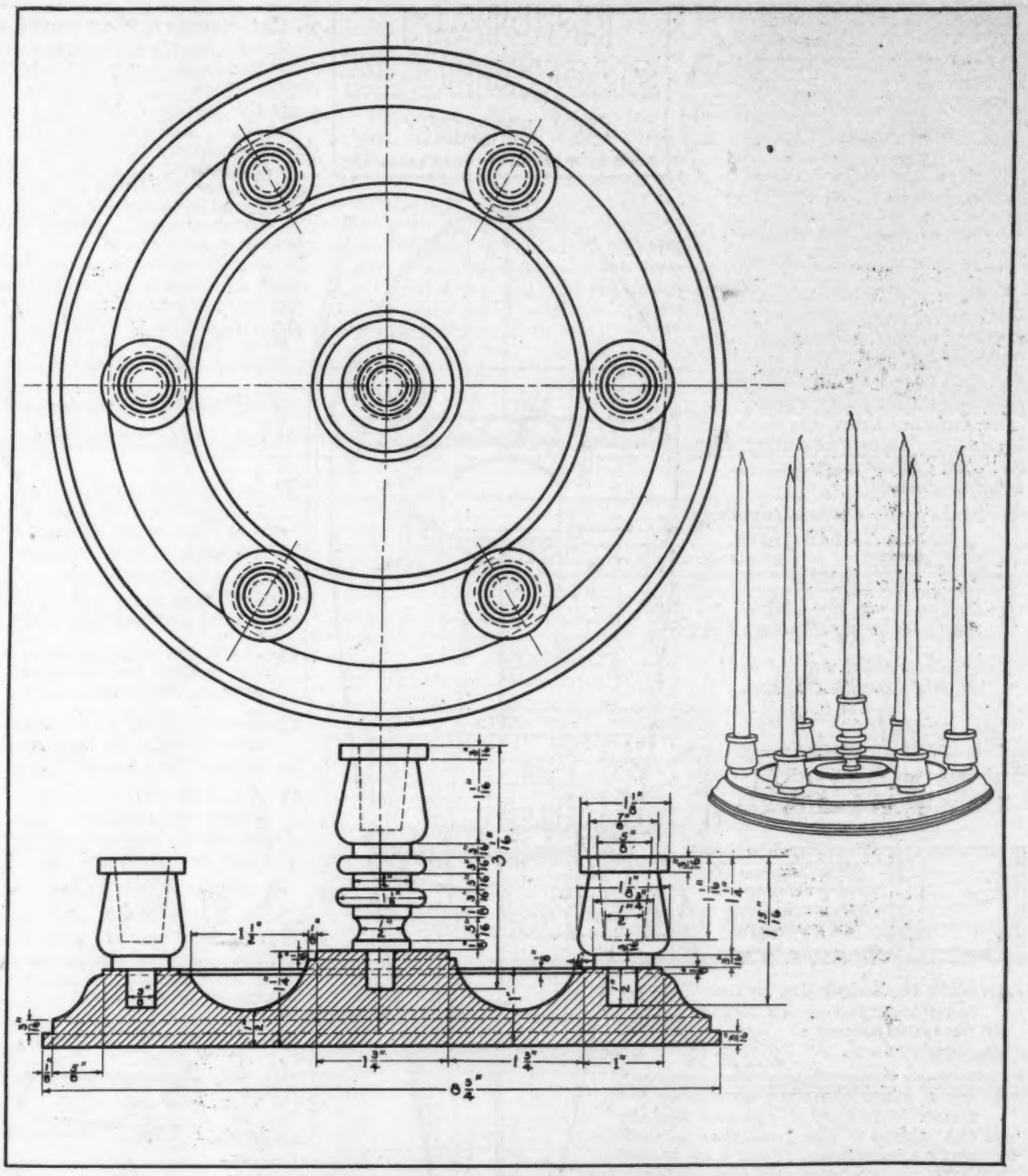
·13· Apply a coat of boiled linseed oil and when that has dried, apply one or two coats of spar or floor varnish.

• SNOWSHOE HARNESS •

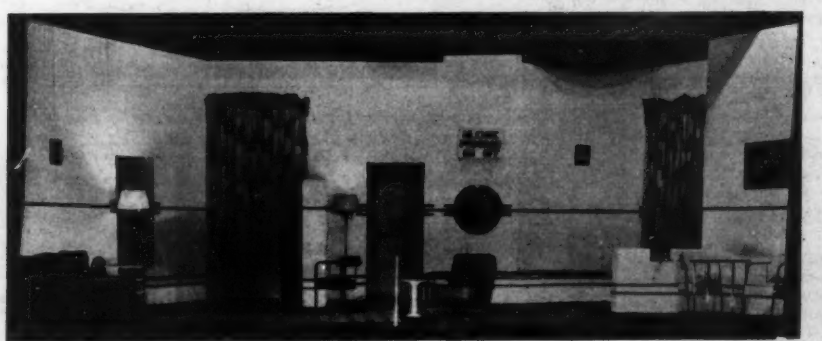
Below is shown a simple harness that may be made of soft buckskin or rope. Dotted line shows where toe of shoe should be when harness is fastened.



When walking with snowshoes the toes of the shoes or mocassins go thru the toe holes as shown below, thus keeping the snowshoes from slipping backwards. The forward end or toe of the snowshoe is lifted and the heel is dragged along. Keep them in a dry place.



Centerpiece designed by W. Ben. Hunt, Hales Corners, Wis.



State setting for production of "Tune In," at the Lompoc High School, Lompoc, Calif. Submitted by Miss Mary E. Bucher, Instructor

Association News

CONFERENCE ON SCHOOL AND HOME WORKSHOP PLANNING

A one-day conference on school and home workshop planning and equipment was held August 22, at Ohio State University, Columbus, Ohio. This conference was especially intended for superintendents, principals, board members, and school architects. It was in charge of Mr. E. L. Bowsher, Director of Education of the State of Ohio. The speakers at the opening session were Dr. William E. Warner, who spoke on the subject "The Ohio Program and Today's Conference"; Mr.

(Continued on page 11A)

(Continued from page 328)

De Witt Hunt, who spoke on "Basic Principles and Examples of Laboratory Planning," and Dr. Elroy Bollinger, whose subject was "Basic Principles and Examples of Equipment Selection."

Mr. Frank C. Moore, Supervisor of Industrial Arts, Cleveland, Ohio, presided at the luncheon and at a panel discussion on "Laboratory and Equipment Problems in Smaller Schools." Those who took part in the discussion were R. E. Augspurger, Fairfield; Carl H. Shanks, Clinton County; George C. Beery, Franklin County; A. B. Murray, Georgetown; S. H. Babcock, Medina County; L. J. Smith, Massillon.

Equipment displays and demonstrations were given by Edward J. Horrocks, on automotives; Herbert Sanders and W. Donald Larrick, ceramics; Otto A. Hankammer and Paul T. Hiser, drawing and the planning center; Herbert E. Rolsten and Victor Kuzman, electrical; Harry Hoon and Lloyd Knox, graphic arts; John A. Whitesel and James O. Stephan, metals; Harold C. McCord and Leonard Bollinger, photography; Burl N. Osburn, textiles; Ralph Rogers and John A. Kuzman, woods; L. H. Lawton, elementary-school laboratories.

At the six o'clock dinner forum, Dr. William E. Warner presided. As part of this conference, there were three half-hour broadcasts over WOSU. Speakers on this part of the program were De Witt Hunt, Gordon O. Wilber, Willis A. Whitehead, Kenneth W. Brown, John W. Nicholls, R. Lee Hornbake, G. H. Reavis, and other school officials and equipment manufacturers.

Personal News

Among the visiting professors on the industrial-arts staff of the Ohio State University during the past summer were Miss Louise H. Lawton; Mr. Burl N. Osburn, of the State Teachers' College of Millersville, Pa.; Mr. Elroy W. Bollinger, of the New York State Department of Education; and Mr. John R. Ludington, of Ball State Teachers' College, Muncie, Ind.

Mr. Elroy W. Bollinger, formerly instructor in industrial arts at Ohio State University, has become a member of the staff of the New York State Department of Education and will be in charge of the vocational-education program in New York City. Mr. Bollinger recently completed a special course, leading to the doctorate degree, at the Ohio State University.

Mr. Raymond W. Phipps, formerly in charge of the laboratory of industries in the high school at Lake Forest, Ill., has joined the staff of the State Teachers' College in New Britain, Conn., where he is acting as chairman of the industrial-arts teacher-education program. Mr. Phipps received his bachelor's degree in industrial-arts education from the Eastern Illinois Teachers' College in Charleston, and his master's degree from the Ohio State University.

Mr. Joseph A. Parsons has been appointed head of the industrial-education department of the Nebraska Wesleyan University, Lincoln, Nebraska.

Mr. Joseph A. Schad, formerly instructor of general shop at Hampton High School, Hampton, Va., has accepted a new position at the High School, Newport News, Va., where he will organize a general-shop course.

Miss Esther M. Morris has been appointed assistant supervisor of home economics in Alaska. Miss Morris, who was formerly assistant professor of home economics in the Michigan State College, will be in charge of teacher training, supervising, and itinerant teaching.

Mr. Frank C. Moore has been appointed supervisor of industrial arts for the public schools of Cleveland, Ohio. He succeeds Howard L. Briggs.

Mr. H. C. Rose, formerly of Augusta, Wis., has become instructor in industrial arts in the senior high school at West Allis. Mr. Rose, a graduate of Stout Institute, has been an instructor in the Augusta High School for the past four years.

Mr. John E. Fintz has been appointed directing principal of special schools and classes of Cleveland, Ohio.

Mr. Stanley S. Radford has been appointed as an instructor in the department of drawing and design of the engineering school, Michigan State College, East Lansing, Mich. Mr. Radford was formerly a member of the faculty of the Arthur Hill Trade School, Saginaw, Mich.

Mr. Edwin A. Lee has recently been appointed director of the National Occupational Conference, with offices at 581 Fifth Ave., New York City. Mr. Lee is a former superintendent of schools at San Francisco, Calif.

Mr. Harold A. Huntington, formerly professor of trade and industrial education at the Indiana State Teachers' College, Terre Haute, has become chairman of the department of trade and industrial education in the Oklahoma A. and M. College, Stillwater. Mr. Huntington received his bachelor and master degrees from the University of Illinois and is completing work leading to the doctorate degree at Ohio State University.

Mr. John R. Ludington, formerly connected with the public-school system of Muncie, Ind., has assumed his duties as professor of industrial-arts education in the Ball State Teachers' College, Muncie. Mr. Ludington is completing work leading to the doctorate degree in industrial arts at the Ohio State University.

Mr. Russell J. Greenly, formerly in charge of the trade and industrial teacher-education program in the University of Akron, has assumed his duties as professor of industrial education at Purdue University. Mr. Greenly received his master's degree from the University of Akron.

Mr. Ivan Hostetler, formerly in charge of the industrial-arts program in the high school at Xenia, Ohio, has become a member of the faculty at the State Teachers' College, Collegeboro, Ga., where he will be in charge of the development of an industrial-arts program in co-operation with Dr. Hoyt H. London. Mr. Hostetler received his master's degree from Ohio State University.

Mr. Lawrence F. Ashley of Charleston, Ill., and Mr. Otto A. Hankammer, of Pittsburg, Kansas, recently completed their graduate work leading to the doctorate degree in industrial arts, at the Ohio State University.

New Publications

Archery Tackle

By Adolph Shane. Cloth, 112 pages, 6 by 9, illustrated. Price, $1.75. Published by the Manual Arts Press, Peoria, Ill.

An excellent book on the long bow. The author discusses the different woods used for bow making and gives directions for making the bow, the arrows, and other archery tackle.

The book also contains a chapter on shooting, tournaments, and games.

Materials of Industry

By S. F. Mersereau. Cloth, 541 pages, 5½ by 8¼, illustrated. Price, $2. Published by the McGraw-Hill Book Company, New York City.

A revised edition of a carefully prepared book on the materials used in our present industrial civilization. In the new edition, obsolete material has been omitted and a considerable amount of new material has been added. There are five chapters devoted respectively to explanations of forest products, nonmetallic minerals, iron and steel, nonferrous minerals, and miscellaneous materials.

Each separate subject is accompanied by a glossary and by a series of questions for discussion. A bibliography is appended at the end of each chapter.

Divide the Word Correctly

By M. J. Haessly, 3710 W. Burnham St., Milwaukee, Wis. Imitation leather, 96 pages, 4½ by 6½. Price, $1. Published by the author.

This is a handy book for the typesetter and the proofreader. Although small in size, it contains the correct divisions of more than 10,000 words.

The need for a book of this type was felt by the author for a number of years during which he served both as printer and as proofreader. Besides the lists of correctly divided words, the book contains the rules for making the divisions, according to approved typographical standards.

Diesel Electric Plants

By Edgar J. Kates. Cloth, 176 pages, 5¾ by 8½, illustrated. Price, $2. Published by the American Technical Society, Chicago, Ill.

This book is No. 3 in the Diesel series. It was developed especially to show the influence which the Diesel has on the characteristics of the electrical equipment for which it furnishes power.

Both d.c. and a.c. voltage regulation in Diesel plants is discussed. The book also contains a thorough explanation of how Diesel engine governors work, and how these governors affect the frequency and load control of the electric generators. Of special interest is the chapter on Diesel locomotives and trains as is also the section devoted to generator troubles.

Science in the World of Work—I

By Frank R. Deming and Joseph T. Nerden. Cloth, 206 pages, 5¾ by 8½, illustrated. Price, $1.28. Published by the McGraw-Hill Book Company, New York City, N. Y.

This book is specially written for trade schools. It treats of the practical aspect of mechanics as applied to life situations. The book contains six chapters devoted to simple machines, friction and lubrication, work, power, and efficiency, parallel forces, angular forces, and properties of material. Each chapter is divided into a number of units, the units again subdivided into (*a*) Informational material about the subject treated; (*b*) suggestions for making one or more experiments; (*c*) a number of questions to be answered, and (*d*) a summary statement that must be worked out by the student.

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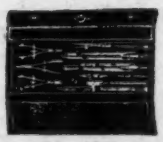

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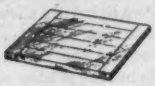

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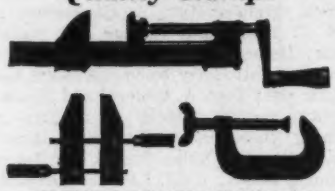

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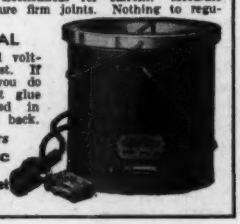

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The Wallace #8 Universal Saw incorporates many exclusive features insuring greater power, greater economy of operation, greater safety, and greater durability. The Wallace shutterguard, the exclusive gear drive, micrometer adjusted fences, safety switch, detachable electric light, made-to-order motors—these things insure your getting the most up-to-date and modern equipment obtainable.

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140 S. California Ave. Chicago, Ill.

School-Shop Equipment News

NEW SCHIEREN BELTING

The Charles A. Schieren Company, 30–38 Ferry St., New York City, N. Y., has issued an illustrated circular, describing its Schieren belting for shop use. This new belting gives increased production at substantial savings, through lower belt costs, lower maintenance, and improved efficiency in manufacturing operations.

The Schieren belting in use insures exceptional pliability, which permits its use on very small pulleys without slip or vibration, at highest speeds. The belting has a uniform fiber tension and a high coefficient of friction. Even on small pulleys at high speed, the pliability and cushionlike surface of the Schieren belts allow them to make uniform pulley contact at all points on the pulley and results in the transmission of maximum power at the lowest cost.

A SELF-CENTERING SCREW

The American Screw Company, Providence, R. I., is marketing the Philips recessed-head self-centering screws and bolts. The recessed head gives greater strength than ordinary slotted heads, so that the screw can be set up much tighter without danger of breaking the head. The new-type head also gives an attractive appearance in any piece of assembled work.

It requires little pressure to hold the Philips screw driver in the screw. Because of the straight-line fit of the screw and driver, it is easy to guide the screw. The self-centering feature of the Philips screw also obviates the danger of screw-driver slipping, thus avoiding scarred hands and marred work.

The Philips screw can be driven or removed with a regular screw driver, but for maximum efficiency, Philips drivers and bits are recommended. Besides the flat-, oval-, and round-headed wood screws, all of the different types of machine screws, stove bolts, and sheet-metal screws can be obtained with the Philips recessed self-centering heads.

NEW SWAN PENCILS

The Swan Pencil Company, 221 Fourth Ave., New York City, is marketing a new "Silver" pencil, which makes a deep silver mark, easily erasable if necessary. These pencils are especially designed for making corrections and additions on blueprints, and have gained quite an acceptance by industry. They are sharpened easily; the points are hard enough to wear well, yet soft enough to make a good clean mark.

The firm also announces a gold pencil, which is very effective for making corrections or alterations on photostats.

Besides the silver and gold pencils, the Swan Pencil Company manufactures colored pencils, which are admirably suited for coloring photographs.

News Notes

Vocational Education in Alaska

The vocational department of the Alaska Territory, under the supervision of Mr. A. E. Schoettler, has made rapid strides during the first year of operation, and plans are in progress for new developments during the coming year.

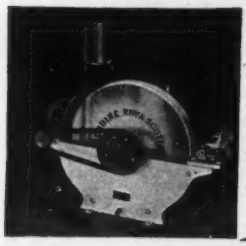
During the past school year, some extension courses in the trade and industrial field were offered, which were peculiar to the territory served. These included courses in taxidermy, Diesel engines, navigation, net mending, as well as courses in blueprint reading, steel square, and carpentry.

Some idea of the size of Alaska and the conditions of transportation may be obtained when it is noted that traveling along the coast is entirely by water. The supervisor has traveled more than 10,000 miles by steamship, motor boat, fishing boat, and coast-guard cutters. In addition, trips are made on the Alaska railroad and by airplane. A supervisory trip ordinarily requires not less than five weeks to complete, and the southeastern towns can rarely be reached in less than four weeks' time, depending upon steamship schedules and the weather conditions.

The people of Alaska are enthusiastic over the work and many new communities have asked for extension classes. Not all of the requests can be met due to the lack of facilities and teachers capable of giving the type of instruction needed. The main problem is the lack of suitable local teachers to conduct classes.

The School Shop Shopping Guide

SHARP TOOLS



WET TOOL GRINDERS

A Wet Tool Grinder especially designed for School Shops, duplicating on a small scale, the conditions and technique used by the manufacturers of fine tools and cutlery. Patented Tool Holder insures perfect bevels and edges. Price without motor—$18.00 delivered in the U. S. Larger floor machine available.

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Write for descriptive folders.

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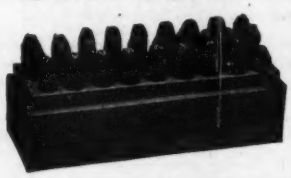

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Work will not buckle with double bar clamp. *Catalog Free*

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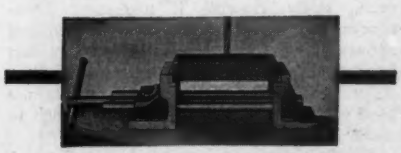

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